

COMPUTERWORLD

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Independent Disk System User Is Satisfied Customer

By Denny Goss

CW Correspondent

Just how good are the much publicized replacements for IBM's 2314 and the independents' double density disk storage systems? Very good, and in many cases better than the IBM units, a recent survey revealed.

Surveyed were users in banking, finance and insurance, from colleges, government, and firms in manufacturing, research and service.

These organizations employ equipment from Ampex, Calcomp, Marshall Data Systems, Memorex, Potter and Telex. Almost all selected the equipment primarily for its price advantage over comparable IBM units, and all carefully investigated service available

before making a decision. Several said the decision paved the way for the use of more independent peripherals.

A Calcomp user, for example, conducted detailed studies comparing Calcomp equipment with the

Spotlight Survey

2314. The faster access time of the Calcomp system resulted in 4% less lapsed time, an advantage that, when combined with price, is a good recommendation for the independent equipment.

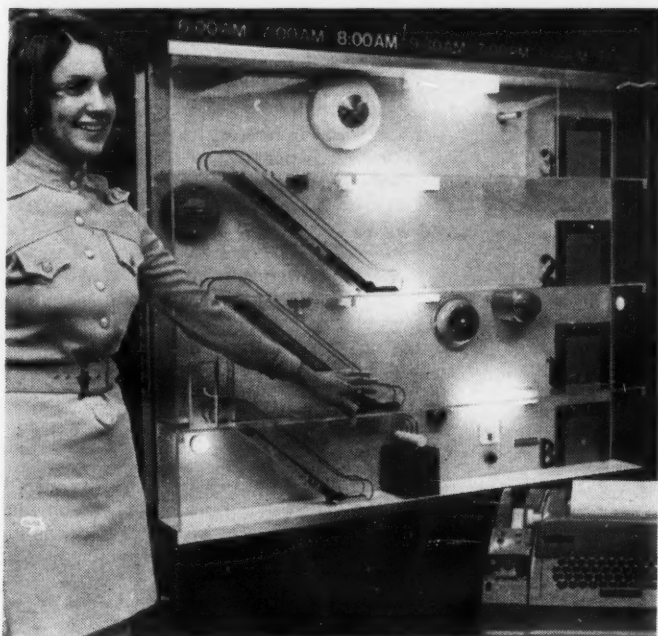
A spokesman for the user said the lower price alone means an annual savings of \$80,000 to \$120,000. The

increased performance would mean still more savings.

The Torrington Manufacturing Co. of Torrington, Conn., is a user of Marshall Data Systems' replacement units and has them interfaced to a 360/40 along with 2314s.

Robert Manion, the firm's manager of computer operations, reported that the Marshall equipment may be more error prone, but errors are more recoverable than those that turn up in the 2314. He added that he has no measurement of the performance of the two systems but believes that over a like period of time, the Marshall equipment might be better than the 2314.

University Microfilm, a division of Xerox in Ann Arbor, Mich., is another user of Marshall equipment. (Continued on Page 4)



Environment Control

A process control system to monitor and control all of the environment of a typical department store was unveiled at the 61st Annual Convention of the National Retail Merchants Association. The system, based on an IBM System 7, controls all the functions of a store including turning on and shutting off the electricity. It also monitors fire detection and security control sensors. (Story on Page 3).

Support for DOS/360 to End; IBM Aims Enhancements at 370

By Don Leavitt

Of the CW Staff

WHITE PLAINS, N.Y. — DOS/360 users will be on their own by April 1973.

Release 26 is the last release of the Disk Operating System that can be used on IBM 360 equipment. And March 31, 1973, is the last date on which users can expect to receive no-charge support for Release 26.

IBM spokesmen added that future enhancements of DOS will be directed towards the IBM 370. DOS Release 27, scheduled for the end of May, 1972, will be the first DOS release to operate exclusively on the newer line of CPUs.

The techniques utilized by Release 27 take advantage of 370 hardware and prevent its use on 360, the company said.

Thus the long-anticipated move by IBM to withdraw its support for DOS/360 is finally under way and users apparently have

some 14 months in which to decide how they will cope with the new situation.

That time frame may be a mirage, however, since IBM has said that "the possibility does exist" that individual components of Release 26 may be reclassified from Class A to Class C support prior to March 1973.

Some DOS/360 users have

adopted a wait-and-see attitude about the loss of support for their operating systems, but one, George Belles of Colt-Crucible, Syracuse, N.Y., sees the handwriting on the wall. "IBM is saying to the medium-sized user, 'you have to go to OS, and acquire more core and a larger installation,' or, putting it another way, IBM is saying, 'hey, spend some money,'" Belles said.

Independent Vendors

Users may be able to gain functional enhancements for continued DOS/360 operation through independent software vendors. A spokesman for one such firm, which markets a highly successful enhancement to DOS, noted his company has tried to fill in wherever IBM has left a hole in its software. He sees no reason why his company should change that policy in the light of IBM's DOS policy.

Some components of DOS had already been downgraded to Class C before Release 26 became available. The announcement of reclassification of other

(Continued on Page 3)

Bell Rejects FCC Request On Tariffs

By Ronald A. Frank

Of the CW Staff

WASHINGTON, D.C. — Direct FCC intervention in AT&T's interconnection policies came one step closer last week when the phone company rejected a commission request to modify its tariff requirements.

The Independent Data Communications Manufacturers Association has told the FCC that Bell's interconnection policies are discriminatory [CW, Dec. 22]. Based on this and related data, the commission staff asked the carrier to change its present policies.

The carrier refused to comply on the grounds that the FCC request would place "undue emphasis on the need to promote competition for the benefit of a few suppliers."

'Controlled Environment'

In a letter to the commission, AT&T said that it favored "a controlled environment in which customer-provided equipment [can be connected] without undue jeopardy to the services of other users."

(Continued on Page 4)

\$10 Million System

Mass. Readies DP Welfare Plan

By Edward J. Bride

Of the CW Staff

BOSTON — It's back to the drawing board for the Massachusetts Welfare Department computer system, but local observers are optimistic that a new \$10 million, two-year plan can work.

Development of the department's computer system has been fraught with errors, delays and cost overruns in the four years since the state took over the welfare function from municipalities.

The computer system is the recommendation of a new internal study which proposes spending \$7.8 million to develop a centralized financial manage-

ment control system and to lease still-unselected hardware.

While the report also suggests that annual maintenance of the system would cost \$3.8 million, Welfare Department employees reported that adequate provisions for overruns were taken.

Besides offering better service to the 60,000 families on relief, the new system should prevent recurrence of the injustices of recent years, when 3,000 ineligible families were given welfare benefits while about the same number of eligible families were denied these benefits.

A recent report claimed errors were being made in 40% of the state's welfare cases, either in

giving too much or too little, or in denying or granting benefits to inappropriate recipients.

New Coordinator

There is still no ability to create computerized files of recipients, noted George Eichman, director of the new Project Management Office (PMO). Eichman, who prepared the new internal reports will coordinate the development of the system, if and when it is approved by state and federal officials.

One of the first steps, however, must be to standardize local forms and procedures in field offices, Eichman told CW last week.

(Continued on Page 4)

On the Inside

NRMA Puts On Show For Retail Users

— Page 3

Special Report: Prospects Of Future Data Carriers

— Page 8

Communications Will Pace DP Industry Growth

— Page 25

Communications . . . 12
Computer Industry . . . 25
Editorial . . . 10
Financial . . . 26
Software/Services . . . 13
Systems/Peripherals . . . 19

Developing Nations — Part III

First Priority: Education, Training for Applications

By E. Drake Lundell Jr.
Of the CW Staff

NEW YORK — There are several ways that the United Nations, countries and even individual companies or organizations can help promote the use of computers in developing nations.

The recommendations and conclusions of a recent U.N. survey of the use of computers in developing countries outline the various forms which international action may take to intensify cooperation in the computer field and the role the U.N. can play in promoting that cooperation, especially in the area of the transfer of technology and the training of personnel.

"Education and training for the application of computers to accelerate the process of economic and social development must receive first priority," is the major conclusion drawn by the study.

To meet this need, the study urges the establishment of both national and regional centers to train personnel for the computer field.

Means should be found, the report says, for creating materials and developing techniques for teaching the effective use of computers and efforts in this area should be supported by the world body and its agencies.

The report notes the problem of training people overseas, i.e., often they never return to their homeland, and urges the development of courses and educational material that can be used in the country embarking on a computer program.

The second major conclusion of the study is that "each developing country needs a broad national policy, consistent with its national goals, on the application of computer technology."

It urges developing countries to formulate plans containing realistic goals, listed in order of priority, so that orderly short-term and long-term development may take place.

It also urges each developing nation to allocate sufficient resources to implement its master plan for computer use.

The third major conclusion is that "international cooperation needs to be increased in activities relating to the application of computer technology to development."

In this line, the report states that "the Secretary-General believes that the General Assembly may wish to consider . . . the establishment of an international advisory board on the application of computer technology for development," which would report annually to the U. N.

In addition, the report recommends that "organizations and institutions in developed countries be encouraged to establish 'twinning' relationships with organizations in the developing countries and that U.N. programs support such action."

Under a "twinning" arrangement, the organization in the developed country would offer its advice and help to the organization in the developing nation in implementing computer-based projects.

The report also recommends that the U.N. call more fully on the international professional organizations for their technical assistance.

The final conclusion of the report states: "Computer technology will increase in importance in the developing countries during the Second United Nations Development Decade and its diffusion and sound application can make a significant contribution in accelerating the rate of their economic and social development."

Therefore, the report says it "is important that in the developing countries:

- "The analysis and systematization that occur when computerization takes place be recognized in itself as a most significant contribution to improving management decision-making and resource allocation.

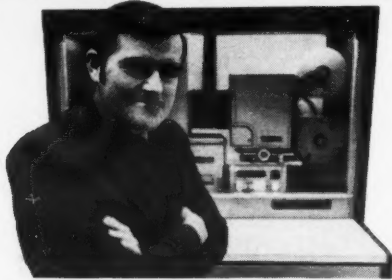
- "Trade barriers including customs regulations impeding the international movement of equipment, magnetic tapes and cards be minimized.

- "Exchange of software and data under appropriate conditions of protection be facilitated and encouraged."

This is the final part of a survey of the role that computers can play in aiding developing nations, and the U.N.'s plans for speeding their application.

"COMPUTER PRINTOUT WAS COSTING US A FORTUNE."

(G. E. Richards, Manager, Data Center, The Goodyear Tire & Rubber Company)



Kodak COM system saved Goodyear \$250,000 on forms alone.

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Call to the Top Proves the Cure

By a CW Staff Writer

COLUMBUS, Ohio — Having problems with IBM equipment? Try telephoning the company's chairman of the board, T.V. Learson.

C. Donald Curry, Ohio Registrar of Motor Vehicles, did, and it worked.

The Ohio Bureau of Motor Vehicles had received its new 370/155 to replace a 360/50 as the heart of its state law enforcement system — a move carefully coordinated with the Department of Finance, since its 370 serves as back-up — but could not get it operating.

"We had a lot of downtime," Terry Massaro, the bureau's data conversion manager, stated. "It was a result of power problems, among other things."

The downtime meant the bureau was falling further and further behind in updating its traffic conviction and driver license records. Massaro said that working with the IBM sales and service staff did not solve the bureau's problem. Curry explained that he got on the telephone and talked with a lot of people, finally talking with Learson himself. "I told him I was a farm boy from Licking County and that for years I drove cars of one make. I told him that I got a car that didn't work right, and I couldn't get anything done about it, so I've been driving cars of another make ever since."

Curry added that he asked Learson if he knew what he meant. He said Learson assured him he did.

Massaro said that he could not be certain if the bureau's problem would have been solved anyway, but after the telephone call, five customer engineers were assigned to the project, and a sixth IBM employee coordinated their efforts. "The system was up in three days," he said.

It Was All DP for the Retail User at NRMA Show

By E. Drake Lundell Jr.

Of the CW Staff

NEW YORK — Computer systems designed for specific user needs were featured here last week as a host of computer firms displayed point-of-sale (POS), credit authorization and environmental control systems at the National Retail Merchants Association's (NRMA) 61st Annual Convention.

"Several years ago there were almost no computer systems designed for the retail industry, even though we are potentially one of the largest groups of computer users in the country," according to one attendee.

"But now all of that has changed," he added.

And from the evidence at the show, it has changed with a vengeance — with almost 20 exhibitors showing computer-based systems designed specifically for the retail user.

One of the most innovative systems on display was a complete environmental and security control system for retail stores based around a System 7 shown by IBM.

The primary problem in designing meaningful retail systems "is the difficulty in communication between the merchant and the computer expert," according to Robert D. Villency, president of Maurice Villency, Inc.

"Even the most astute merchant can have difficulty in verbalizing what his needs really are, and conversely, even the most expert EDP man has difficulty in recognizing the merchant's real needs," he said.

"To further complicate the problem, the right information improperly organized largely dilutes the effectiveness of your system," he added.

The new products in the point-of-sale area were displayed by the Uni-Tote Division of General Instrument Corp. and Pit-

ney Bowes, but displays of equipment were made by almost all companies in the business including The Singer Co.'s Business Machines Division, NCR, Olivetti, Regitron Systems, Ricca Data Systems, TMD Corp. and Transaction Systems Inc.

The Uni-Tote system combines the firm's Model 300 POS terminal with a new minicomputer, the General Instrument System 75, into a total system.

The System 75, which can have a cycle time of 1,200 or 800 nsec and a core size from 8K to 64K bytes, can be interfaced directly with IBM 360s or 370s or any IBM-compatible mainframes, Harold Rapaport, senior vice-president of General Instrument, said.

The System 75 would be used as a store controller in a typical application, he said. It could be connected to from several dozen to several hundred POS terminals in the store and also connected to the retail chain's central computer at some other site.

The four new products from Pitney Bowes were included in its display, which also included the firm's Spice electronic register systems.

The products, which will be marketed by Monarch Marking Systems, a subsidiary, are the automatic tag encoder-imprinter, Model 1920, which operates from computer-produced tab cards; an automatic tag reader, Model 2310, for backroom batch reading; the Model 1894 tag Pin-On machine, and the MDR (Monarch Data Recorder) 2100 System for order entry and data reporting from multiple locations.

In addition to the new POS systems, there were several new credit authorization systems unveiled at the show.

Two new electronic credit authorization and check cashing control systems — a software-based computer-operated Credit-Chek system for larger department stores and the Orom (Optical Read Only Memory) system for smaller depart-

ment stores, specialty stores, discount stores, and supermarkets — were introduced by Credit Systems, Inc.

The heart of the Credit-Chek system is the Model 1600 mini with a direct access memory channel that transfers 833,333 word/sec into its core memory. This allows the CPU to supervise 22,000 terminal unit and authorizer transactions per hour while maintaining a comprehensive data base for each account in disk files.

Orom is designed for stores with one to 32 cashier stations, or more, and requires no outside communication lines. A low-cost in-store ROM processing unit containing a 14-in. acetate disk holding up to 30,000 negative 16-character records is accessed electronically from point-of-sale terminals at cashier counters.

TRW, Inc. which last month in Los Angeles inaugurated "Validata," a service for immediate on-line approval of non-cash transactions, announced that it will offer the same service in New York.

DOS/360 Support To End March 31, 1973

(Continued from Page 1)

elements was contained in the cover letter that went out with Release 26. Further reclassifications will "undoubtedly" be announced six months prior to the effective date of change "in the normal way," IBM said.

April Reclassification

The Release 26 transmittal told users that Group 1, 2 and 3 utilities would be reclassified as of mid-April, and Cobol D would drop to Class C status as of June 15, 1972. That is similar to the pattern IBM followed, under OS/360, of withdrawing support for non-standard Cobol at least a year after the availability of an ANS compiler.

Once components are reclassified, normal development under Centralized Programming Services ceases and no more releases are issued. User or field office-found bugs may be submitted through the Authorized Program Analysis Report (Apar) procedure, up until the date of the reclassification, however, and if accepted, will be processed by IBM until a solution is forthcoming, the company said.

DOS Release 26 is described by IBM as a "functional stabilization" of DOS for the 360 user. Essentially a maintenance release, it will gain support for some new devices in May 1972. The new components, which will become part of DOS Release 27 at the same time, will support the 3270 Display System, 3735 Programmable Buffered Terminal and the 2596 Card Read/Punch devices.

DOS Release 27 will include support for the 3330 disk storage subsystem, and logic for the enhanced repertoire of instructions available on the 370 CPUs. These are the components of the release which make it inoperable on the 360, IBM explained.

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Centralization May Cure Welfare Ills

(Continued from Page 1)

His report was compiled partially as a reaction to an independent legislative study last summer [CW, June 23], and to a "list of critics," he related, including at least two consulting firms which had "assisted" in developing a still non-existent welfare computer system.

Among the critics were three unemployed DP consultants, who performed the 1971 study. They recommended formation of the PMO, and suggested new staffing and new approaches to administering the Welfare Department's computers.

House Speaker David M. Bartley said last summer: "We cannot hope to begin controlling the cost of welfare, if we are unable to control the data used in the functioning of the program."

The new staffing could consist of internal employees, outside consultants, or a combination, Eichman noted, but one requirement will be that PMO retain control over development of the system, he stressed.

One of Bartley's aides said last week that the department now "has to go back to the drawing board," set hardware and software specifications, and go out for bids. While other states have portions of welfare systems operating (such as paying Medicare/Medicaid bills), this is an

overall approach being proposed.

"This is the beginning," he said, adding he is "confident" that the concepts are workable. The report, which was not made available to the public, lists certain "milestones" to measure progress, Eichman added.

"Besides giving better service, we will have the tighter controls necessary," he continued.

The state legislature is currently examining the study, and

state officials will try to convince the Federal Government that implementation will be worth the federal contribution of 50%.

The department's computer center still consists only of an IBM 360/40, which is "inadequate," Eichman said. While no specific hardware is mentioned in his report, Eichman suggested the new equipment might be along the caliber of a 370/145, or perhaps two 145's.

These Disk Users Happy

(Continued from Page 1)

Arbor, Mich., evaluated Potter's entry against the 2314 and found it to be faster. The Second National Bank of New Haven, Conn., a Memorex user, found that supplier's entry to have faster read/write and access times than the 2314. The Aluminum Co. of Canada, Ltd., which had experience with the 2314, reported that its Ampex units became operational more quickly, a statement echoed by Wallis McMath, assistant director of the computer center at Texas A and M, another Ampex user. McMath said that the school's first units were delivered on a Friday and were operational on a Monday.

Western Geophysical Co. of Houston, Texas, mixes Calcomp disk units with 2314s and reports no problems. Manion pointed out that Marshall's plug-to-plug switchability was one of his firm's primary considerations in selecting Marshall equipment.

No users reported any significant problems with their systems. Some said there were incidents when the equipment was first installed but considered them normal. In several instances, the problems were due to disk pack imperfections.

Manion at Torrington described a few initial problems but added that only one incident has been experienced over the past 10 months. He said that his staff was able to debug four drives a few weeks after installation.

Joseph Berwey, operations supervisor at University Microfilm, reported that his firm's Potter equipment was operational in two days.

J. W. Smith, director of information services at the Massachusetts Mutual Life Insurance Co.

in Springfield, a user of Telex units as substitutes for the newer 3330 disk system, reported no problems with the Telex equipment but added that the equipment has been operational less than a month.

All independent disk system users were very careful to study the service offered and compare it to that offered by IBM before reaching a decision. Joseph Sicignano, systems and programming officer at the Second National Bank, said that service was the major consideration that had to be resolved before selecting Memorex. "The service is great," he declared.

Robert Marden, assistant vice president of operations at the Putnam Fund Distributors in Boston, pointed out that Memorex's service exceeded that offered by IBM. "Memorex will 'babysit' if necessary, but not IBM," he explained.

Besides price what influenced the decision to go with an independent disk supplier? Massachusetts Mutual had good luck with Telex's single density disk units. Western Geophysical had good experience with Calcomp plotters. Optimum Systems, a service operation in Palo Alto, Calif., chose Memorex because it believed it had the best reputation. Aluminum Co. of Canada was impressed with Ampex's core memory units.

Texas A and M was also influenced in its selection of Ampex due to experience with the core memory units, but, as McMath explained, use of the memory units required that an Ampex service man be on-site all the time. So, servicing the Ampex disk units cost the school no more.

All those surveyed said they would recommend the equipment they were using to others.

Bell Defies FCC on Tariff Change

(Continued from Page 1)

The FCC had asked AT&T to allow direct connection of certain dial and answering devices provided by non-Bell suppliers [CW, Dec. 29-Jan. 5], pending further study.

Current tariffs require that user-supplied equipment must be connected to the telephone network through an interconnection device. However, if the same equipment, supplied by the same manufacturer, is rented from the telephone company, no interconnection device is required.

But the carrier said that the FCC staff's request was "an unwarranted shortcut and appears to be inconsistent with the work" of the PBX Advisory Committee. The PBX group is

working to establish standards for equipment certification.

An FCC staff spokesman said that the Common Carrier Bureau has "gone about as far as it can" with the issue. "It is now up to the commission to take action," he said.

The AT&T reply was called non-responsive by the staff source. The FCC letter had asked for a definition of network performance standards used by Bell to determine when harm is done to the phone network, the source said. "But in reply they gave us quality of performance standards instead. If they have no network protection standards, maybe none are needed," the FCC spokesman said.

News Wrapup

WU Settles Customer Lawsuits

NEW YORK — A computer service bureau has had a breach of contract judgment vacated, and will pay its former customer a total of \$1.795 million of the \$58 million being sought in various lawsuits.

The plaintiff, Law Research Service Inc. (LRS), had been a customer of the computer service operation of Western Union Telegraph Co. (WU). LRS complained that WU was not promptly loading new legal cases to the data base of law precedent, to be used by lawyers in legal research.

LRS won that case, and was awarded \$1 million in damages by the New York State Supreme Court [CW, April 7, 1971]. The two parties have now agreed to settle additional cases out of court, for \$1.795 million. LRS is currently in Chapter 11 of bankruptcy proceedings, so both the court and LRS creditors must approve the plan.

Computer Adds 73d Homicide to Record

DAYTON, Ohio — The computer operated by this city's police department disagreed with its operators and uncovered a murder.

The system uncovered a homicide not counted by detectives and disagreed with the announced total of 72, a one-year record. The discrepancy came to light when a monthly report of criminal activity showed 67 homicides for the year. The homicide squad carried a figure of 66 for the same period.

A count of homicides showed the computer was right, and updated figures were prepared.

GOP Builds Up Debt for DP Redistricting

LANSING, Mich. — Republicans in this state are out drumming up money to finish paying for computer work on drawing legislative and congressional districts.

The computers are being used to draw new legislative and congressional districts as required by the Constitution.

To keep the computers working, the state headquarters came up with some \$7,000 to go with the \$10,000 from the Republican National Committee. This has resulted in census and political data being fed into the computers.

Bills May Crack Down on Faulty Ticketing

ALBANY, N.Y. — Legislation may be forthcoming to rectify the "quixotic behavior" of the city's Parking Violations Bureau whose computer has been billing erroneously for parking tickets.

Sen. John D. Caemmerer (R-East Williston) said his bills would insure the right of the recipient of a summons to an appeal in person before an examiner. The bureau has been sending summonses to innocent drivers, to out-of-city residents who weren't in the city at the time of the violation and even to non-drivers.

A ticket would be "deemed dismissed" if the bureau didn't answer a "reasonable inquiry" sent by registered mail within 30 days.

Traffic Control Plan Gets Vote of Confidence

CHARLESTON, S.C. — A recently completed rush hour study of this city's computerized traffic control system revealed that it has reduced travel time in the downtown area by 17.4% — as much as 50% on some main thoroughfares — and has resulted in an overall cost saving to motorists of \$261,804 or \$2 per vehicle.

The dollar values on the savings were derived from figures supplied by the Texas Transportation Institute from a study it completed recently for the U.S. Department of Transportation. According to Harold M. Raynor, the city's traffic director, with the institute's figures it was determined that it cost \$2.70 per hour per person to operate a motor vehicle in the city. Each second a motorist is delayed costs him 8 cents.

Average driving speed in the downtown area has gone up from 21.8 miles an hour to 24.3 miles an hour, Raynor said.

The study was a follow-up to one conducted before the computerized system was installed. It also revealed that there were 47.5% fewer stops for traffic signals and 48.5% less delay time.

A total of 130,575 vehicles used the system in the first year. The cost was \$4.21 per vehicle.

Building on Schedule, Thanks to Computer

PITTSBURGH — Everything was on schedule in the building of the \$7.2 million Marriott Inn until the riggers got "deer fever" and took to the woods for a couple of days last fall.

Nevertheless work has been progressing and the computer now predicts the Inn can open 10 weeks ahead of schedule. The computer schedules everything from the pouring of concrete to pinpointing of the opening date and has been reprogrammed to print out the off-duty pastimes of construction workers as well.

The computer has cut the completion date from Dec. 8, 1972, to the Nov. 6 opening. Before the computer was used the opening date was expected to be Jan. 22, 1973.

'Fold, Spindle, Mutilate...and Hug'

CHAGRIN FALLS, Ohio — Damaged input is no problem for Bob Ullman's "computer." He advertises for his fuel oil and gasoline business, "Fold, spindle or mutilate our bill. Our computer (my wife) doesn't care as long as you pay it."

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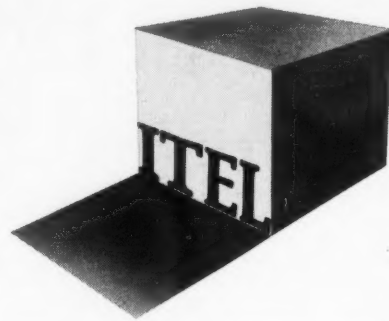
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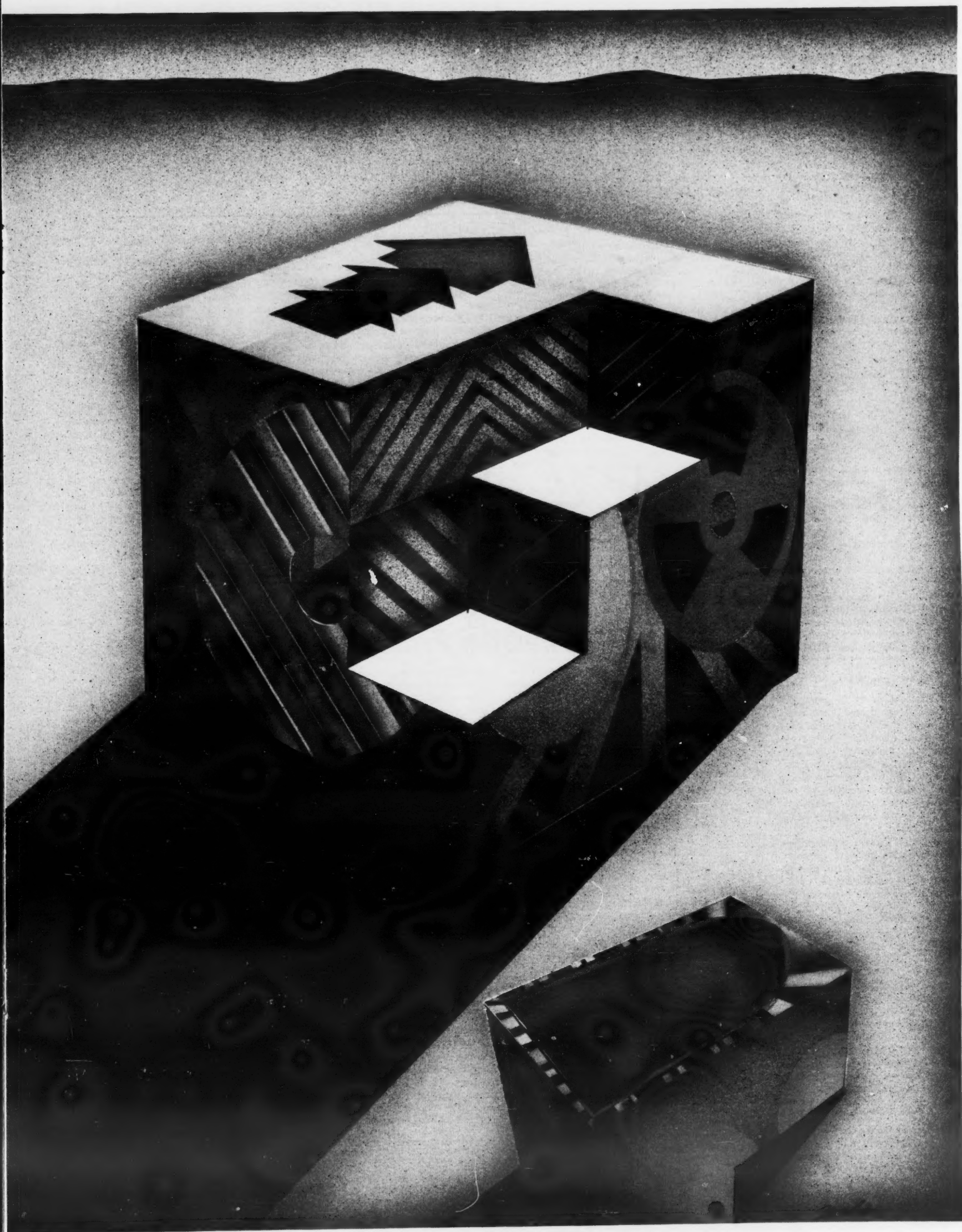
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● Too Many Systems? How Will Bell React?

Those Great Expectations Of the Future Data Carrier

By Ronald A. Frank
Of the CW Staff

After Microwave Communications Inc. (MCI) broke new ground with its initial Chicago-to-St. Louis proposal before the FCC, other potential specialized carriers decided the concept had merit.

Although there are currently about 1,960 specialized carrier applications pending before the FCC, this figure is misleading. Each individual tower site in a microwave system is classified as a separate application by the commission. Consequently, a large number of tower applications will make up one system filing.



Each future Datran subscriber would use the Digital Communications Console.

For example, the first route now being operated by MCI includes 11 individual sites or applications.

Among the 1,960 applications, there are only 14 separate firms which plan regional or national specialized carrier networks. Some of the larger networks include separate links for individual routes. The proposed MCI coast-to-coast system includes 19 separate regional routes, all of which will be interconnected much like the individual operating companies of the Bell System.

Year to Complete

Even with approval in 1972, most microwave links will require at least nine months to a year to complete construction and testing and begin service to users. Some of the applicants with existing private networks already in operation may be able to reduce this lead time. Datran, which plans to construct its entire system before providing services to users, estimates it will need several years to build its network.

Significantly, AT&T plans to begin service on its all-digital network in early 1974. This date coincides with present Datran plans to inaugurate service.

Some of the specialized carrier applicants are already providing non-data services. One of the largest microwave systems now in operation belongs to Western Telecommunications Inc. (WTI), which operates about 13,000 route miles in the West and Midwest through 16 states.

Most of the WTI system is used for non-digital services such as television transmissions, but data services are in the forefront of the specialized carrier offerings being planned. In addition to high-speed CPU-to-CPU channels at 50 Kbit rates, WTI is also considering store-and-forward operations with front end processors installed at key traffic centers.

New Link

The company is currently completing a new link in the Oregon-Washington area that will have a two-way transmission capability to handle digital traffic. WTI is expected to use this new link as a proving ground for its digital services in anticipation of FCC approval for its specialized carrier applications.

With its buildings, antennas and towers already in place along much of its proposed specialized carrier routes, WTI ex-

pects to cut its construction costs and time compared to some of its competitors. "It's simply a matter of installing additional microwave transmitters and some more antennas," according to Doug Johnson, director of WTI's commercial department.

WTI has filed a proposed data tariff that includes more than 90 digital service offerings, Johnson said. Several other specialized carriers have modeled their services after the WTI proposal, he said. The company expects to receive FCC approval soon with first services to users beginning before the end of the year.

One specialized carrier applicant, Southern Pacific Communications Co., is an outgrowth of the large Southern Pacific railroad communications system that has been in operation since 1961. The road already has more than 6,000 miles of microwave circuits in operation.

Southern Pacific will use existing microwave towers to install its specialized carrier equipment, according to John Albertson of the engineering staff. "We will supply services at rates 5% lower than others because of our existing experience," Albertson told CW.

Switched Network

The largest single applicant is the Data Transmission Co. (Datran). It proposes to build a switched national network, similar to the existing phone system, that will bill users on a timed basis. The Datran

With the possibility of many specialized carriers dotting the landscape, the question of internetwork compatibility has been raised by some users.

A subscriber of a data network that ends abruptly at a state border will want some assurance that another carrier will be available on the other side to pick up his signals and carry them further.

Minimal Problem

With point-to-point microwave systems such as MCI, Western Telecommunications and most of the others, this compatibility problem will be minimal. Effectively a three KHz channel on one system will be virtually identical from one microwave system to the next. And most of the specialized carrier applicants claim they are ready to interconnect with other systems when the time comes.

For the data user the risk appears small. If for some reason his specialized carrier cannot bring his signals to some out-of-the-way remote site, he will probably be able to switch to the telephone system for a portion of his network, where necessary.

Datran users might have more of a problem in this regard because they will be using a switched service which is not directly compatible with other carriers.

But Datran spokesmen have said that their system will be connected with any long haul transmission systems that offer economy and don't jeopardize the reliability of the Datran operation. Even so, the Datran user will be operating on a dedicated system where he is limited in the sites he can reach.

The technology required to interconnect separate microwave systems is relatively simple. The data signals are transmitted from tower to tower by highly directional antennas which aim or beam their signals to the next tower. The transmission equipment and technology for

Special Report: Communications, Part II

The new specialized common carriers may eventually revolutionize communications, but their effect on most users will be gradual.

Despite the many optimistic predictions, users will not be immediately affected by the new services. Data networks take careful planning before they are set in operation. This month's special report gives users an overview of what is available, what can be expected, and the trade-offs associated with new data services.

Last week's report considered how the specialized carriers evolved, what MCI service means to the firm's first users, and the potential data uses of cable TV systems in urban areas.

system would begin service in 1974 but the FCC has yet to rule on the application.

Datran plans to switch its calls (it will handle only data) through computers installed at regional centers. While the CPU interaction would give potential subscribers special services such as the ability to reach several terminals simultaneously, the plans require extensive special software. According to estimates of the firm of Arthur D. Little, the Datran system could cost up to \$400 million for construction.

The company has already spent an estimated \$10 million in anticipation of network operation. Datran plans to build its initial network to serve 35 major metropolitan areas in about three years. Unlike MCI which is connecting regional systems into its growing network one at a time, Datran plans to throw the big switch on its 35-city network early in 1974.

Datran plans to offer switched service at data rates of 150 bit/sec, 4,800 bit/sec, 9,600 bit/sec, and 14.4 Kbit/sec. Rates will be based on six-second blocks of time called Data Units. The company plans to have both local and national rates, each

of which will be based on the amount of Data Units used by the subscriber.

In addition, Datran will provide its users with a Digital Communications Console (DCC) that will be installed as the interface between the user's site and the Datran network. The DCC will cost \$15/mo and will act as a terminal unit to provide necessary signals and coordination between calls.

Since the Datran system will not have a voice capability, it will not be possible to talk to another subscriber under normal operating conditions. Data users on the Bell System who now pick up the handset on a Bell modem to set up the conditions for a data transmission will have to use the control keys of the DCC instead.

While Datran rates will be based on usage time and data speed, a "typical minimum monthly fee" will be \$40/mo, according to a Datran spokesman. This figure would include two hours of "national transmission time" and three hours of "local transmission time" plus the \$15 monthly charge for the DCC.

Is there enough room for a duplication of specialized carrier routes, in many

(Continued on Page 9)

Local Loop Connection Problems Can Be Solved

this type of system has been used on private microwave systems and in the military for some years and it is considered well within the state-of-the-art.

It is also relatively simple to construct the main transmission path or backbone of the proposed microwave systems. Transmitting towers must be spaced at line-of-sight intervals and maintenance is usually minimal.

Problem Area

A larger problem area is the local loop connection from the user's site to the specialized carrier backbone. The FCC is currently studying several proposals in this area that would utilize special frequencies for these short distance transmissions.

FCC to Rule on Satellites

Next week's special report looks at the prospects of early benefits from satellite communications and the methods required to adapt such systems to the needs of the computer user. The eight applicants for satellite operations are currently awaiting an FCC decision on satellite policy expected this spring.

The report will also discuss the communications growth areas predicted for the seventies and the Bell System plan to apply special rates to specific users.

Local loop methods are being studied by all the specialized carriers. The reason is obvious. A highly reliable backbone transmission system is severely limited when a majority of subscribers cannot be easily connected to the system.

Among some of the possible local methods are short distance microwave transmitters that would send data from the roof of the subscriber's building to

the specialized carrier's terminal.

In addition, Datran has been experimenting with optical systems using infrared and laser beams, with encouraging results. More conventional hook-ups using telephone company wires (already available at most locations) and cable facilities can be used for local loops.

But the use of analog telephone wires means that users need to install modems. Future all-digital links will eliminate modems in favor of simpler interface devices.

MCI's initial service to subscribers will utilize telephone company-provided local loops. But telephone facilities make a specialized carrier dependent on lines not entirely under their control. So the desirable goal is end-to-end service totally supplied by the specialized carrier.

Agreements

The use of telephone company wires for local loops places some limitations on the specialized carrier that also affect the user. To obtain telephone facilities, a specialized carrier must sign an agreement with the local phone company. In many cases such agreements are not subject to approval by regulatory agencies. Since the phone company knows its lines will be used by competing carriers, these agreements often include high mileage charges which must be passed on in some form to the data user.

There are distance limitations as well. In Chicago the MCI-Illinois Bell agreement limits local loop service to a 30-mile radius from the city.

But these problems are not insurmountable and it is expected that the specialized carriers will develop their own local technology as soon as the regulatory and technological problems have been settled.

"Bell...May Want to Attract Data Users With Specially Priced Dial-Up Rates." — a Consultant

Bell Can Cut Cost or Adjust Its Private Line Rates

(Continued from Page 8)

geographic areas? Undoubtedly several of the new carriers will be able to operate along the East or West Coasts without stepping on each other's toes, because the demand for service will be high enough. But in less populated areas most observers expect to see a consolidation of specialized carriers when the economic chips are finally sorted out.

Will this mean that the user of a specialized carrier might get left high and dry by a firm that didn't make it? One veteran FCC staff member sees this as a minimal risk to the subscriber. Historically, in the communications field, other carriers have absorbed the less healthy ones with a minimum of problems to the user.

More than likely there will be some consolidations before all the new carriers begin service. But the FCC said in its specialized carrier ruling that the marketplace will have to decide who among the specialized carriers survive. Most users feel that the extras promised by the new carriers are worth the economic risk.

As part of its decision to allow the entry of the new carriers, the FCC said that existing carriers (meaning primarily AT&T) could compete as long as they didn't take unfair advantage.

So while MCI is beginning to provide service, the big question for users is how will AT&T react?

With the exception of limited duplication of service from Western Union, AT&T has been virtually a monopoly supplier of communications facilities for many years. Therefore very few precedents are available to determine what the Bell System will do.

Selective Cuts

In the area of pricing, Bell has two major options. It can either selectively cut costs on those routes where it directly competes with a specialized carrier or it can adjust its private line rates across the board.

Asked about possible Bell System competition with MCI and other specialized carriers, John D. deButts, AT&T board vice-chairman, said:

"If we continue to use average pricing [the new carriers] could probably underprice us. If we go to some form of route pricing that recognizes the volume on that route, there's no question that we can beat whatever price they can come up with because we can put the plant in cheaper than they can."

The AT&T veil of secrecy may have been lifted a little early in December when new rates were filed for certain private line charges. Included was a proposed increase of 400% in private line installation charges, and lesser rate hike plans for service terminal costs.

Rearranging Rates

AT&T said that the additional \$30 million it expects to gain from the new tariff will not alter its allowable rate of return set

by the FCC at about 8%. If indeed AT&T is rearranging its rates to put an increased burden on private line users, the effects could hurt potential users of the specialized carriers.

For example, a user who interconnects his AT&T lines with MCI for a portion of his total route will now have a higher extra set of installation and service terminal charges to figure into his costs.

While it may seem surprising for AT&T to compete by raising its rates, some observers feel it makes a lot of sense. Since Bell has for years averaged out the costs of all its services, high cost offerings such as private line facilities have consistently been "underpriced." Therefore if AT&T gets increased revenue from its private line subscribers it will be less affected by any users who defect to the specialized carriers, these observers say.

From the standpoint of today's data user Bell's big move will come in 1974 when its new digital data network is scheduled to be ready. Some details of the new service have already been announced by AT&T

New Technology?

Described as a new technology from Bell Labs, AT&T plans to use its existing microwave links for new data channels. This Data Under Voice (DUV) service will utilize previously unused portions of existing channel capacity. For subscribers this could mean that the new digital service will be reasonably priced, because minimal new equipment is needed by Bell.

To provide DUV, Bell will have to install new transmission equipment, but it will be done at existing microwave sites. This means the higher expense of erecting new microwave towers will be bypassed in many geographic areas. The DUV facilities will be compatible with presently installed local loops. These loops are the wire pairs from which the user connects his DP equipment to the Bell network.

The DUV facilities now planned for start-up in January 1974 are described as all-digital by AT&T. For the user this could mean the elimination of the modem or data set, required on today's lines.

Digital Interface

But while the data set may be eliminated, a simpler interface device or translator will be needed on these all-digital facilities. Bell labs is working on such a digital interface device, to be called a Channel Terminating

Unit (CTU).

Presumably the CTU will be installed at each end of an all-digital link. And while it probably will be less complicated than a modem, it will still mean an added monthly cost for the Bell data user. For those who prefer non-carrier supplied equipment, Computer Transmission Corp. already has a similar unit that operates on local loops. Called the Intertran, it is priced at about \$1,900 and is probably the forerunner of the new breed of data sets.

Although the specialized carriers will have their greatest impact on Bell's private line services, one economist thinks Bell may react by providing new dial-up data offerings. "Bell will have no competition on the dial-up network. Therefore it may want to attract data users with specially priced dial-up rates," according to D.E. Winslow, a consultant who specializes in the regulatory pricing area. Other observers agree, noting that the data equivalent of a Wats line might offer real savings to high-volume communications users.

Bell will also try to hold onto its larger private line users, according to Winslow. But it may have a difficult job in this area. When the FCC first authorized private microwave networks with its "Above 890" decision in 1959, AT&T countered with tariffs that offered discounts to large users of bulk private line services.

These tariffs, known as Telpak, led AT&T into lengthy drawn-out regulatory proceedings. Ultimately the Telpak tariffs were judged to be discriminatory by the FCC and while the issue still is pending, Bell does not want another regulatory fight. It is generally agreed that Bell overreacted with its Telpak discounts for large users. Therefore AT&T can be expected to be a lot more pragmatic in countering the threat posed by the new specialized carriers.

But should AT&T worry about MCI and the other specialized carriers? Some think not. These observers point out that data users make up only a small portion of Bell's total revenues. And even if all the specialized carriers successfully offer data and other service to users, their total revenues will be only a small dent in Bell's profit picture.

If Bell decides not to compete it would allow the new carriers to concentrate on serving their subscribers without becoming embroiled in competitive marketing battles with the phone

company. But this view seems rather idealistic and Bell will probably have to react in some way. It has already given notice that it intends to file a "competitive tariff" for private line services between Chicago and St. Louis. Presumably such a tariff proposal will be designed to counter MCI's offerings on that route.

To most data users any rate comparisons between Bell and the specialized carriers are premature. But a few real users are operating on MCI's first link. One of these, Trans Union Systems Corp. is saving about 40% over the charges it used to pay AT&T for similar data facilities.

One important reason that the specialized carriers can provide cheaper (and often more reliable) service is that they have less overhead than Ma Bell. It is estimated by one former Bell engineer that it costs AT&T about \$400,000 to construct a microwave site. MCI is building the same type of facilities for

about \$150,000, and as long as the new carrier operates efficiently, users can expect the savings to be passed on in lower rates.

There are those in the Bell System who say MCI is getting its equipment from mail order discount houses which offer equipment of questionable quality. But in one recent test on the new MCI St. Louis-to-Chicago link, the reliability of the equipment was shown much better than anyone expected.

The transmission test was run by International Communications Corp. which now has its Milgo modems operating at MCI users' sites. Data was transmitted at 9,600 bit/sec for about five hours. During that time more than 300 Mbit were transmitted without an error.

In addition, "the channel itself was virtually noise free and jitter free," according to Sang Wang, vice-president of ICC. Many Bell users would welcome such reliability on their links.

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Editorial

Data Security, Control Must Go Hand in Hand

The FBI's "national data bank" continues to grow larger — and so does the threat to adequate security.

State officials now are attacking an FBI regulation that a computer linked to the National Criminal History System must be used only for law enforcement purposes [CW, Jan. 12].

It should be noted that this rule was not thought up on the spur of the moment. It was originally proposed by the Project Search people who did the groundwork on the system with funds supplied by the Law Enforcement Assistance Administration, U.S. Department of Justice. The LEAA itself later made the same recommendation.

State officials cite a number of reasons why they believe the rule is impractical. They note that some states require that all state computers be consolidated under a single agency. They note that a computer dedicated to the NCHS might be idle most of the time and therefore unnecessarily expensive. And they note that the easiest way of supplying the backup CPU required by an on-line system like NCHS is to have a consolidated installation.

As to security, they insist that adequate hardware and software security can be built into a shared system.

We disagree.

In the first place, we don't think any national system that can be accessed by a variety of local law enforcement and other justice agencies can be considered secure. So we are completely opposed to any attempt to decentralize control any further.

And we don't see any real need to change the rule.

Large states should be able to dedicate two CPUs to justice work without hardship.

Smaller states and cities can acquire two smaller CPUs and load all their justice work on them, including court and correctional systems. If this doesn't keep the computers busy, the justice agency which operates them could get permission to do service bureau work for other government agencies while still remaining in total control.

FBI Director J. Edgar Hoover summed up the situation this way:

"If law enforcement or other criminal justice agencies are to be responsible for the confidentiality of the information in computerized systems, then they must have complete management control of the hardware and the people who use and operate the system. These information systems should be limited to the function of serving the criminal justice community at all levels of government — local, state, and federal."

We emphatically agree. The FBI already has more information on file than we think it needs, and it is making more and more of it available by remote access. Since government agencies love to collect information and DP people love to massage and disseminate information, we can assume more and more types of personal information will be added over the years to the FBI's remotely accessible files.

Therefore, every effort should be made to tighten security — not weaken it.

Deliverance or Delusion?



Letters to the Editor

Charges Should Equal Value of Service

Reference is made to Alan Taylor's "Computer Bills: Should the Charges Vary With Each Job Execution?" [CW, Nov. 3].

The basic point underlying his discussion is the distinction between prices and costs. This distinction is clear in the marketplace where the customer and the vendor are at arm's length. What the customer pays for a service is the price of the service, while the cost is what the vendor has had to expend to produce the service.

From the user's point of view, the value of the same job executed at different times will be the same and therefore the price should be the same. On the other hand, from the point of view of the organization furnishing the service, the cost of the same job done at different times may be different from time to time.

It is my present opinion that the charges made should not be mere cost allocations, but instead should be charges which are equal to the value of the service rendered.

The problem with this principle is the determination of the value of service, a much more difficult task for an internal service agency than the determination of the cost of service.

Eric A. Weiss
Consultant

Sun Oil Co.
Philadelphia, Pa.

Assign Resources To Find Answers

Alan Taylor's Nov. 3 report scrambles the concepts of direct costs with indirect costs and then pronounces the resulting omelet inedible.

When a production process has two or more types of output, the indirect costs associated with the production process must be arbitrarily assigned to the units of output. There is no alternative.

This argument, when applied

to a multiprogrammed computer operating in the environment Taylor described, can be translated approximately as follows: the operating system and its concomitant resources are indirect costs; the same resources (plus others) when assigned to process the user's work are direct costs. How the two are separated is complex but not much different from other highly integrated production processes.

Taylor is very helpful in presenting the "Overcharging Indicators," for they can be used to test whether or not an assumed cost technique is "methodologically appropriate" or not. Taylor is helpful in raising the issue by asking, "Should the Charges Vary With Each Job Execution?"; resources clearly need to be assigned to find answers. Alan Taylor should be involved in the study so he can learn about this subject.

H.H. Hirschl, Director
Administrative DP Center
Purdue University
Lafayette, Ind.

Programs Wanted For Home Building

As a result of the many requests for information on computer programs, the National Association of Home Builders has embarked on a program to review the existing computer programs applicable to the home building/construction industry and disseminate this information to our membership.

We would appreciate hearing from companies who already have programs for feasibility analysis; single, multifamily, garden and high-rise construction; mobile home parks; and commercial and industrial developments.

Please address responses to:

Richard P. Todrin
National Assoc. of Home Builders
1626 L. Street, N.W.
Washington, D.C. 20036

A Key to Success?

I refer to the Dec. 15 letter from James L. Bradley, vice-

president, Management Data Services, Inc., in which he referred to a CDP's Dec. 1 letter asking what "OEM" means.

Let me just state that knowledge of the meaning of OEM is not as much an essential piece of data processing knowledge as one might think for writing a program, running a computer, or managing a DP shop, any more than vindictive letter-writing is essential to becoming a vice-president of a company (or is it?).

Terry E. Berryman, CDP
Davenport College
Grand Rapids, Mich.

Avoiding the Crush

Your blurb at the end of each week's *The Taylor Report* which reads in part, "The views expressed in this column do not necessarily reflect those of *Computerworld*," is borne out by your subscription renewal practice of supplying too-big return invoices and too-small return envelopes.

However, I have used and enjoyed your publication thoroughly (from the first issue onward) and so I forced the wrinkly invoice and my bent-up check into the envelope, anyway, thus avoiding this crushing experience for one more year.

Mark C. Ryan
Chicago, Ill.

When the tab with the pin feed holes is torn off, the form will fit in the envelope. However, a recent batch of forms was not properly perforated and the tab on the original can't be torn off easily. The carbon copy of these forms is properly perforated and may be returned instead of the original. Ed.

Computerworld welcomes comments from its readers. Preference will be given to letters of 150 words or less. *Computerworld* reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to: Editor, *Computerworld*, 797 Washington St., Newton, Mass. 02160.

Well Done, Grass Roots, The Breakthrough Is Yours

During the past few months I have been watching with very considerable interest the activities of the Society of Certified Data Processors, and the grass roots opinions on professional matters that they were publicizing on the Professional Viewpoint page in *Computerworld*.

These were opinions not just of society members alone but of the general data processing professional whether or not a society member, or even a CDP holder. Just professional opinions, nothing more, nothing less.

The latest arguments raised seem to deal with questions somewhat internal to the profession — such as how to avoid being given unprofessional jobs (finding excuses to sack other professionals), or how to avoid having to sacrifice family life at the employer's request. These types of discussions are good and important. A professional cannot give of his best unless provided with an adequate professional environment. For the moment I would like to discuss some of the more important implications that have been involved in some of the earlier discussions — discussions dealing with the effects of data processing outside our profession.

These discussions have centered around just what the duties of the general professional are, and what he believes they should be. This is grass roots material and of real leadership quality — leadership that the writers of our various codes of ethics have never been able to provide.

What the Professionals Said

What these working professionals said is so simple that it might well not be noticed. They voted strongly to defend the good name of their profession, by taking action to stop the use of "The Computer Failed" alibis even to protect their employers.

This is important. No industry, business or profession — and certainly not one developing as much as data processing still is — can afford to be known as an all-purpose scapegoat without taking vigorous countermeasures. I was glad about this response. But I was also glad the professionals did not stop there.

Output Responsibility

They also said that the data processing manager did, in fact, have a duty to notice and protest when computer output was either inaccurate or illegal.

And that, my friends, is not just important — it is also brand new in our profession! Moreover, in at least my opinion, it is a prerequisite to becoming real professionals, and not just highly paid technicians.

Use Bill of Rights

One of the most important implications of this acceptance of a professional duty is that it provides the usee (a name that I use for the person — such as a credit card holder — whose records are maintained on a computer by some using department or firm) with some rights for the first time.

In a professional environment, the usee has the right to expect that the people in the data processing operation will be real professionals — and will not ignore inaccuracies in computer output. This is good and important.

This acceptance also gives a usee a general reassurance that as he sees society moving fast into a computer age, the professionals will not ignore the needs of

society to have its laws and regulations obeyed. This also is good and just as important.

In fact, so important are these implications that in celebration of this grass-roots leadership being prepared to go beyond the outdated ethics codes of our tradition-bound profession, I thought it would be good to start writing a Computer User's Bill of Rights — based on the data produced by the Society of Certified Data Processors.

There is a difference, naturally between the wording of a professional opinion, and the right that comes out of it, so I will try to explain matters step by step as I go.

The voting said that a DP manager had a duty to know about inaccurate or illegal computer output. It is certainly possible and proper for a DP manager to instruct other departmental personnel to watch out for such occasions, so that in fact the duty applies not just to the overworked manager himself, but also to the rest of the profession. Therefore we can say that a usee has a right to expect all DP professionals to watch for and report

"The status of the computer professional is now seen to be tied into the rights that we give to the innocent third parties whose records we process without having them represented when we make our decisions."

inaccurate or illegal computer output.

The voting of these working professionals did not specify where the report should be made, but insofar as computer professionals are in fact professionals, then the report should be made like all other professional reports — to corporate officers or their formally designated representatives.

Bill of Rights

So, now that we have determined the content of the material, we can start developing some wordings to put the content into use.

Here are some of my first drafts:

WHEREAS INACCURACIES in computer output, however caused, may hurt others, they should never be ignored by computer professionals, but shall be individually reported to the responsible corporate officer.

Then, for the case of illegal computer output, an equivalent set of words could be used, like this:

WHEREAS ILLEGAL computer output, however caused, may hurt society, actual or suspected illegalities should never be ignored by computer professionals but shall be reported to the responsible corporate officer.

That is what the grass roots professional has said should occur — and I agree with him. I like the way he has effectively given rights to the people whose records we store (and sometimes mangle!). This is long overdue.

But in particular I like the fact that in giving something away the professional has actually gained something for himself! He has now described some of the aspects under which computers should, and should not be used. If he has a duty to report inaccuracies, etc., then surely his employers have a duty to listen if they are to employ him professionally. So we now have the start also of the Computer Professionals' Bill of Rights!

A professional, we see, has a right to have a formal reporting channel to the responsible corporate officers. Moreover, his use of such a channel should not expose him to criticism. He may, for instance, have occasion to use it preventively, as for instance when inaccuracies are only possible but have not yet occurred.

And he must have a right to use it when problems have occurred, even though the problems may be financially embarrassing

Draft for a Computer Bill of Rights

• Whereas Inaccuracies In Computer Output, However Caused, May Hurt Innocent Third Parties Such Inaccuracies Shall Never Be Ignored By Computer Professionals, But Shall Be Individually Reported To The Responsible Company Officer; and

• Whereas Illegal Computer Output, However Caused, May Hurt Society, Such Illegalities Or Suspected Illegalities Shall Never Be Ignored By Computer Professionals, But Shall Be Individually Reported To The Responsible Company Officer.

Moreover, In Order That Such Inaccuracies And Illegalities Be More Expediently Rooted Out It Would Seem That:

• Owners & Operators Of Computers Wishing To Provide Professional Level Use Of Data Processing Must Provide Formal Reporting Channels For All Computer Professional Staff To Responsible Corporate Officers For The Reporting Of Actual Or Suspected Computer Output Inaccuracies Or Illegalities, and Shall Require That Such Channels Be Used Whenever Such Faulty Output Is Known Or Suspected; and that

• No Action, In Any Guise, Shall Be Taken Against A Member Of The Computer Professional Staff Who Has Reported Actual Or Suspected Computer Output Inaccuracies To The Designated Corporate Officer, Whether Or Not Such Reports Are Later Shown To Be True; and that

• No Allegation that Computer Errors Caused Any Processing Failures Anywhere In The Organization Shall Be Made Without The Allegation Itself, Its Distribution And The Supporting Evidence Having Been Supplied To The Computer Professionals Involved.

to his employer.

Action against a professional for warning about possible dangers, or actual ones, would be as irresponsible behavior as action against a state medical officer for reporting dangers to the water supply, or the outbreak of cholera.

Factually, we know that in the event of

need not repeat it here.

As a next step I'd like to see our industry leadership follow this grass roots leadership. And I'd like to hear of alternative wordings, or alternative concepts that others may feel are more appropriate.

But even without this hoped-for action, one thing is certain: the status of the computer professional is now seen to be directly tied into the rights that we give to the innocent third parties whose records we process without having them represented when we make our decisions.

And that was a real surprise, for me, at any rate.

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Communications Analysis

Tariffs Add to DAA Confusion

By Ronald A. Frank
Of the CW Staff

Data users served by independent phone companies are discovering that the need for a Data Access Arrangement (DAA) often depends on some very confusing tariffs.

With the FCC calling on AT&T to explain its current connecting arrangement policy [CW, Dec. 29-Jan. 5], data users of independent phone companies are hoping that the commission's concern will carry over to their installations.

At issue are current telephone tariffs that require the use of a DAA at sites where data sets (and other equipment) have been installed by independent suppliers. With most Bell System phone companies this requirement is relatively simple. Users either have a Bell-supplied data set, or a non-Bell supplied data set with a DAA.

But with independent phone companies the situation becomes more confusing. Many of the independents supply their subscribers with equipment

from many non-Bell suppliers. In such a case, a user might get a Sangamo Electric Co. data set installed by the General Telephone Co. without a DAA. But if the user were to buy (or rent) the same data set directly from Sangamo, the local phone tariff would require him to have a DAA.

Asked whether the FCC was concerned with independent phone company DAA requirements, a commission staff member said it was a "close cousin" of the AT&T interconnection policies that are currently being scrutinized by the commission.

Installations which have both carrier and non-carrier supplied equipment are called mixed sites. Some examples will illustrate how confused the situation can get.

Triangle Universities Computation Center in Research Triangle Park, North Carolina, is served by General Telephone Co. TUCC is a non-profit center which serves the DP needs of schools and universities. The center has Bell 103 modems

which General Telephone installed, so they operate without DAAs. In addition TUCC has Tuck Electronics 103 type modems which are installed with Bell System DAAs that General purchased from Western Electric.

Some of the Tuck modems have been installed with DAAs supplied to General by Pulse Communications Inc. The user is happy with the Pulsecom DAAs for several reasons. First they take up about 30% less room than the Western Electric (Bell) units. More important, the Pulsecom DAAs can be mounted in varying positions and can be stacked.

The Bell DAA has mercury relays which require that the unit will be wall mounted.

Pulsecom is also reported to be developing printed circuit board versions of DAAs which can be rack-mounted with shared power supplies to save both space and costs. Under present Bell policy, AT&T operating companies may not use non-Western Electric DAAs, even when they are unable to obtain Bell units. While it is known that some innovative users have purchased DAAs from non-Bell sources, it is difficult to determine whether any of these units are operating on Bell lines. Such an installation would be a violation of present Bell tariffs.

One of the strangest DAA problems took place at a large East Coast oil company installation. The company owns Western Electric 103 data sets which it purchased some years ago through Graybar Electric. When New Jersey Bell was called in, its installers hooked up the data sets without DAAs. Shortly thereafter the phone company notified the user that the data sets would have to be re-installed with DAAs.

The user is still not sure why his Western Electric modems are operating with access arrangements. But to make the installation even more bizarre, the early 103 data sets were easily hooked directly to the telephone network, but they had to be modified to operate with the DAA units, a spokesman said.

AT&T Proposes Cut In 201 Data Rates

WASHINGTON, D.C. — AT&T has proposed a reduction in monthly rental and one-time installation rates for its 201A and 201B data sets.

Filed with the FCC, effective Jan. 21, AT&T said it planned to decrease the charges for competitive reasons. Both the proposed decreases and the reference to competition were regarded as unusual for AT&T, according to an FCC staff source.

Rates for the data sets would drop from the present \$72/mo to \$47/mo, AT&T proposed in its tariff filing. Installation charges would be reduced from \$100 to \$75, if the tariff goes into effect.

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Random Notes

Batch-Oriented 'Autotab' Released by Capex Corp.

PHOENIX — Autotab, a financial planning software package that has been in use on the GE time-sharing network for the past year and a half, is now available for in-house use on IBM 360/370 or Honeywell 600/6000 CPUs from the developer, Capex Corp. The package is designed to allow non-programming users to generate forecasting, business modeling, budget systems, sales analysis, cash flows, returns on investments without help from the DP staff. It operates in a batch environment, or under RJE, CRJE or TSO, in 60K bytes on a 360. It is available for \$7,500 on a perpetual license from Capex at 2613 N. Third St., 85004.

Real Property Income Studied By Alton Package With B3500

SUNNYVALE, Calif. — Banks, real estate developers or brokers, with access to a Burroughs B3500, are able to simulate investments in income-producing real property in great detail, with the Real Estate Investment Analysis Modeling software from Alton Associates Corp., 505 W. Olive Ave., 94086.

Within the model, the results of statistical analyses of a large number of input parameters are integrated to produce sophisticated investment guidelines. The \$10,000 model is capable of estimating parameters when factual data is unavailable.

Piping Compared to Local Codes By Service From Texas Company

HOUSTON — Engineers concerned with the design of piping systems can send their isometric drawings to Engineering Technology Analysts Inc., 3310 Richmond Ave., 77006, for stress analysis and checking against applicable piping codes.

The service supports power, petroleum, gas and nuclear piping systems.

NCR Police Software Extended

DAYTON, Ohio — NCR has released additional modules of the Law Enforcement software designed for use on Century Series CPUs. A Control and Translate module builds files and handles input validation for the other segments of the system. The Case Inventory unit is described as the operational module of the system, keeping users posted on current actions.

A Police Information module maintains the master files on wanted persons and stolen property, generating reports appropriate to those areas. The Case Inventory and Police Information modules lease for \$8,100 each. The others are available without cost.

BA Broadens Payroll Service

SAN FRANCISCO — Subscribers to the Bank of America payroll service, particularly manufacturers, wholesalers, retailers and contractors, can have more comprehensive management information reporting through new features in the service.

The payroll service has been extended to provide for the withholding of state taxes, as recently enacted. In addition, the service is said to combine information from the payroll and payables service into one managerial report resulting in better control and a clearer distribution of material and labor costs.

TBI, Scopus Services**Quality of New, Old Tapes Checked**

By Don Leavitt
Of the CW Staff

Magnetic tape-oriented installations should be able to operate with higher levels of confidence in the physical condition of their files, through the use of either or both of two new services. Those users who buy their own tapes can have them tested by Time Brokers Inc. (TBI) under its Tape Quality Control Service.

Established libraries can be brought up to fixed standards of quality, and then maintained at those levels, through a tape purchase-lease back plan offered by Scopus Corp., Lowell, Mass.

Under TBI's new service, users receiving shipments from their tape vendor, forward a percentage of the order to TBI, without opening the original shipping cartons. TBI tests each reel on its electronic equipment and provides a commented test graph when the tapes are returned to the user.

TBI says that it can check any half-inch magnetic tape, either 7- or 9-channel, and charges \$3.50/reel, with no minimum price per test session. The firm is at 500 Executive Blvd., Elmsford, N.Y., 10523.

IBM FDPs Aid Hospitals, Clinics

WHITE PLAINS, N.Y. — Half a dozen new Field Developed Programs (FDPs) from IBM can help hospitals and clinics solve a variety of accounting problems. Four of the programs are used on System 3 hardware; the others, on larger equipment.

Two of the System 3 programs focus on patient accounting while the others support accounts payable and inventory control functions. Users of IBM's Shared Hospital Accounting System (Shas), on 360/370 CPUs, can pick up support for Medicare accounting with another of the FDPs, and users of IBM 1800 systems are provided specialized hospital data acquisition capabilities with the last of the new programs.

One of the simpler programs for a card-oriented S/3, Medicare Billing, handles the routine processing and billing for patients and provides management reports and printing of government-supplied forms to fulfill Medicare requirements.

The Clinical Accounting package, geared to a disk-based S/3, can also generate Medicare forms, but outputs conventional patient accounting statements as well. Insurance statements and revenues and expense summaries are also available with this FDP.

Data needed to control payments to vendors, including both the writing and reconciliation of checks, are available with the General Stores Accounts Payable package, while inventory management, including generation of purchase orders, is provided by the General Stores Inventory package. Both of these FDPs are for card-oriented S/3s.

The Shas Pending Insurance Claims Accounting, on a 360/370, maintains a file of claims forwarded under the Medicare Part A program.

Each of the FDPs is available under license agreement with monthly charges for the first 12 months of use, after which charges are waived. The charges range from \$100/mo for General Stores Inventory system to \$1,185 for Hospital Data Collection and Communication.

The Scopus purchase-lease back plan is intended to help users overcome contamination and physical damage caused by poor library procedures and mishandling of the tapes. During the first year of the plan, all of the user's tapes will be evaluated on Scopus equipment, the company said.

Tapes that are found to have an unacceptable number of errors, a criteria established by the user and not Scopus,

can be retired and replaced.

The user has the option of specifying the manufacturer of the replacement tapes, the company added.

Once the library has been brought up to the user's chosen quality level, Scopus performs periodic cleaning, component inspection and replacement and continuing evaluation of the tapes in service.

Scopus can be contacted through P.O. Box 1241, Lowell, Mass. 01852.

Program Backs Systems Planners

PITTSBURGH — Systems and programmer analysts can reduce the time needed to create and maintain system specifications, and programmers can cut sharply into the time needed to code Cobol programs, with the Programmer-1 utility software from Compdata Services.

The program generates record layouts, file I/O flowcharts and selective identification, Environment and Data Division Cobol source statements, or any combination of these options, all in a single pass of the system.

While the package is designed to show the make-up of individual files and their relationships to programs within a system, it does not consider internal program logic. It creates neither Procedure Division coding nor detailed program logic flowcharts.

The Cobol source statements generated by Programmer-1 can be directed to

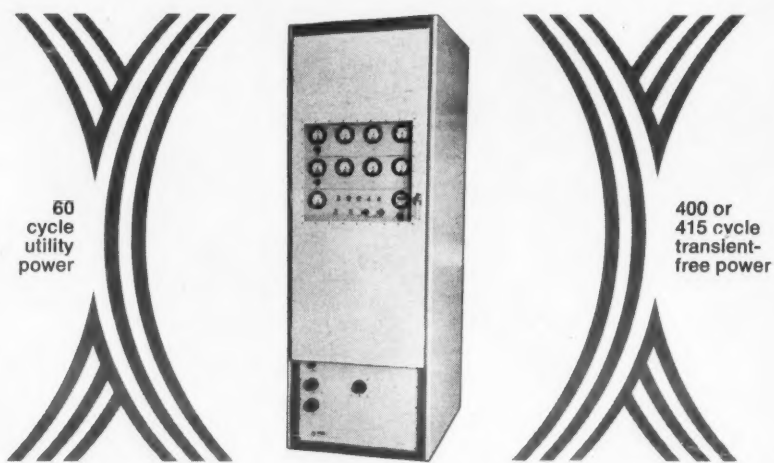
punched cards, tape or disk, and ultimately catalogued on a user library, to be combined with conventionally coded Cobol program logic as input to a compiler.

The file I/O flowchart symbols are similar to or conform to those recommended or adopted by Ansi. Supplementing the standardized shapes, however, Programmer-1 also prints the specific type of device on which the designer expects the file to run.

The software operates under either DOS or OS/360 in 48K of memory, with a disk or tape.

Programmer-1 is available in object form for \$565, including documentation, a supply of specification sheets and six months of support.

Compdata Services is at 530 Sixth Ave., 15219.

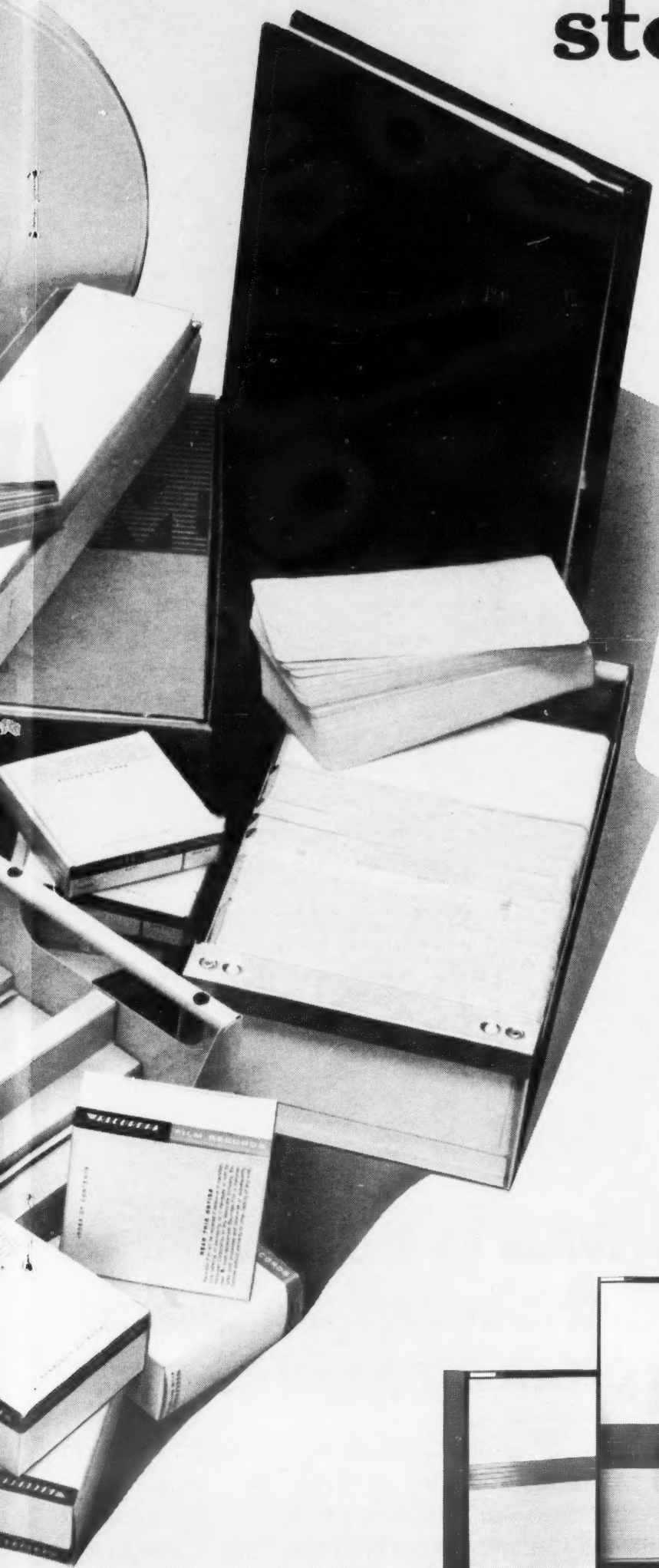
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MEDIA MANAGEMENT SYSTEMS

The Forum and Exhibition Schedule

Each Day

9:00-9:40
Keynote Address

Day One — Lawrence Feidelman

Mr. Feidelman will address the entire audience from 9:00 to 9:40. His subject is data entry, and his experience makes him an expert in this field. Currently he is President of Management Information Corporation of Cherry Hill, New Jersey and editor of *Data Entry Today*. He's an instructor at Drexel University, and recently collaborated with George Bernstein on a 15-year study and projection on the DP Industry.

Day Two — Dr. Dixon Doll

Dr. Doll will speak on Data Communications. He is an acknowledged expert in this field, and does consulting work in addition to his activities as a faculty member of the Eastern Michigan University graduate school of business. He is also President of the Ann Arbor Chapter of the ACM.

Day Three — Charles Lecht

Mr. Lecht's subject is Operational Efficiency. He is an internationally known speaker, consultant and author. His programming books are recommended reading for the CDP exam of the DPMA, and he has prepared several lectures for the American Management Association. Mr. Lecht is President of Advanced Computer Techniques of New York.

Each of these speakers will also observe the panel discussions and deliver a summary during the conference luncheon.

9:40-10:30
Panel Discussion

Panelists are regional experts in the particular field. They have first-hand experience with the latest equipment and services, and they are known in their areas for their progressive management principles. They are not representatives of computer manufacturers.

Principles and operations are the target for discussion, not equipment suppliers. General questions are encouraged.

10:40-11:45
Workshops

Each panelist leads a workshop — and this is where your specific questions are discussed and worked out. Where the discussion goes depends on your needs. What do you, the user, want to learn or discuss?

12:15-1:30
Conference Luncheon

The keynote speaker summarizes the important points of the day's panels and workshops over a pleasant lunch.

1:00 PM-9 PM
Exhibits Open

You've listened and talked all morning. Now you can see the latest equipment and services in action. 60 exhibitors present their latest, in a pleasant, uncrowded exhibit hall.

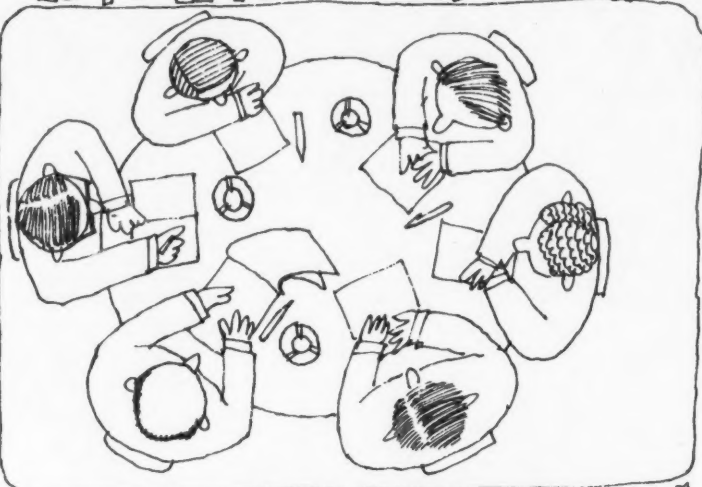
9:00-9:40 KEYNOTE ADDRESS



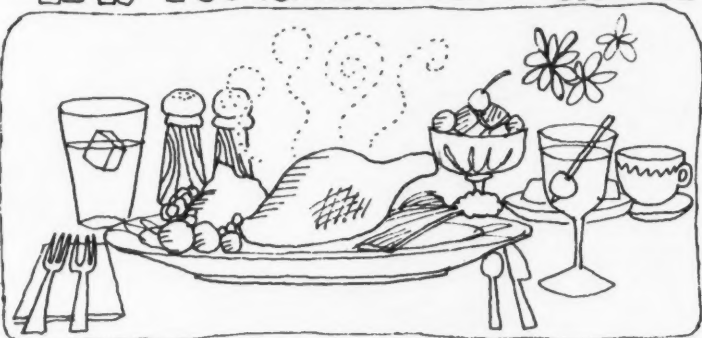
9:40-10:30 PANEL DISCUSSION



10:40-11:45 WORKSHOPS



12:15-1:30 CONFERENCE LUNCHEON



TOPICS

On each day of our three-day show we are devoting our forums to a particular topic of wide current interest to computer users.

First Day

DATA ENTRY

The keynote session on data entry is followed by panels and workshops on

- Keypunch Replacement: key to tape, disk and cassette devices
- OCR
- Intelligent Terminals (distributed processing)
- Direct Data Entry/Source Data Automation

Second Day

DATA COMMUNICATIONS: THE CHOICES

The keynote address deals with the overall picture, and is followed by panels on these subjects:

- Communications equipment from mainframe makers and common carriers
- Communications equipment from independent suppliers
- Data Transmission via private (lines, microwave) networks
- Data Transmission via carriers (lines, microwave)

Third Day

OPERATIONAL EFFICIENCY

Panels and workshops deal with the following topics:

- Core Extensions
- System Utility Software Modification
- Independent Peripheral Usage
- Dedicated Systems vs. General Purpose Computers

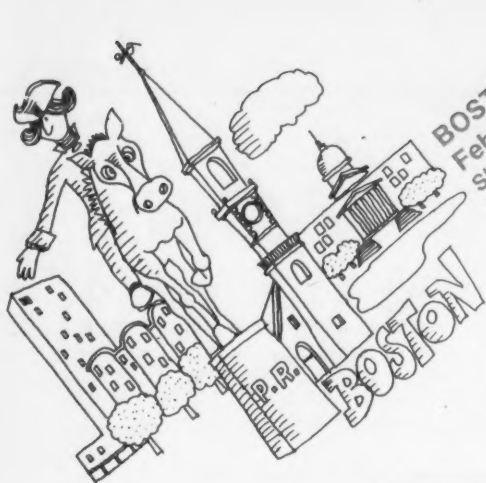
EXHIBITORS

The following is a partial list of exhibitors:

- Lockheed Electronics Company
- California Computer Products, Inc.
- Novar Corporation
- Sanders Data Systems, Inc.
- Incoterm Corporation
- Inforex, Inc.
- Centronics Data Computer Corporation
- Iomec, Inc.
- Hewlett-Packard Company (Cupertino)
- Trendata Computer Systems Corporation
- Techtran Industries, Inc.
- Boeing Computer Services, Inc.
- Graham Magnetics, Inc.
- Digital Equipment Corporation
- Eastman Kodak
- Varian Data Machines
- Tally Corporation
- Interdata
- Sycor, Inc.
- Nashua Corporation
- Hazeltine Corporation
- Applied Data Research
- Texas Instruments Incorporated (Digital Systems Division — Houston)
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- Intel Corporation
- Input Output Computer Services, Inc.

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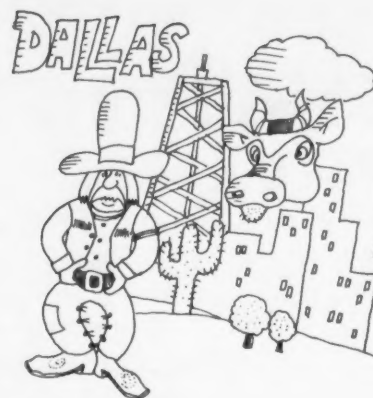
The Computer Caravan is sponsored by Computerworld. And it's designed to give you a chance to spend one, two or three days at a nearby, uncrowded, professionally oriented seminar and exhibition. You'll be discussing the topics that interest you with experts in the field. Experts who are user-oriented. Who know your problems and have first-hand experience with the state of the art. Then you'll have a chance to see the latest equipment and services in action, as 60 companies show you what they have to offer.



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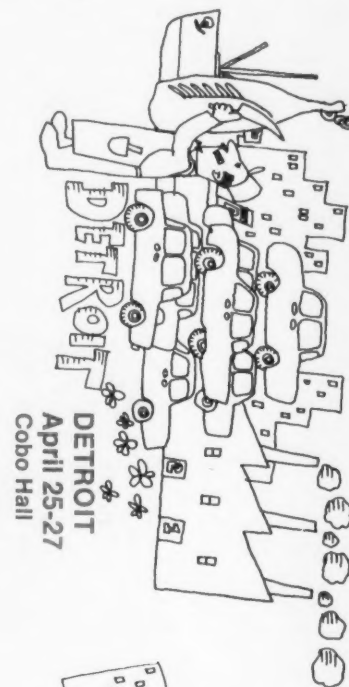
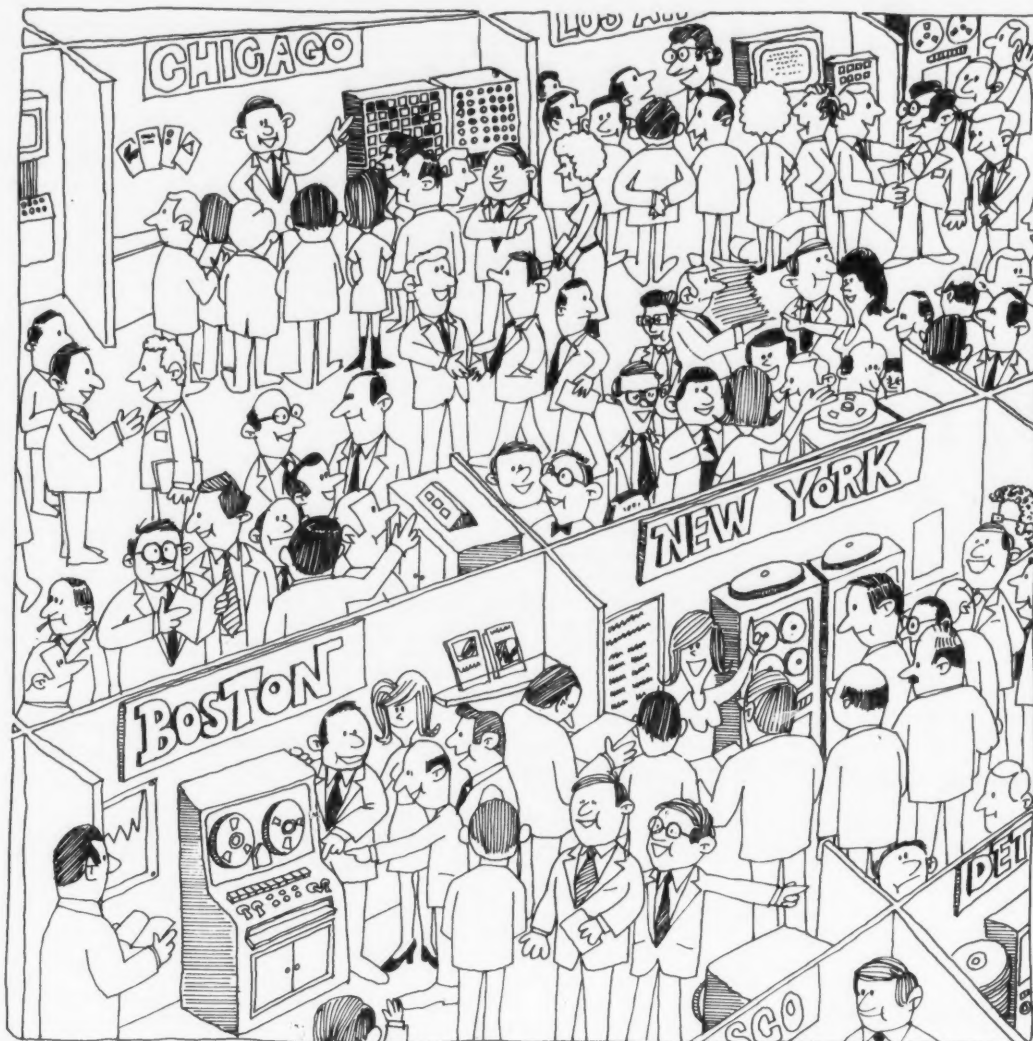
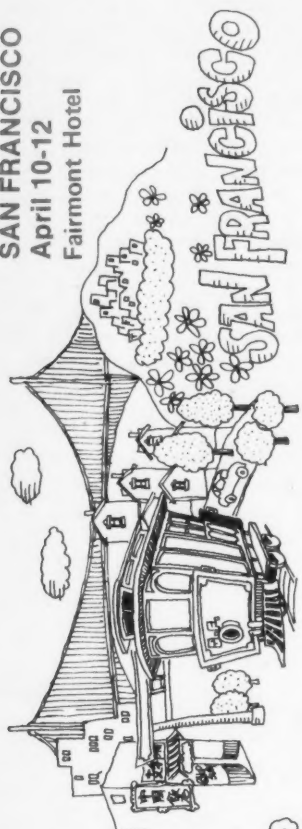


LOS ANGELES
April 4-6
The Ambassador

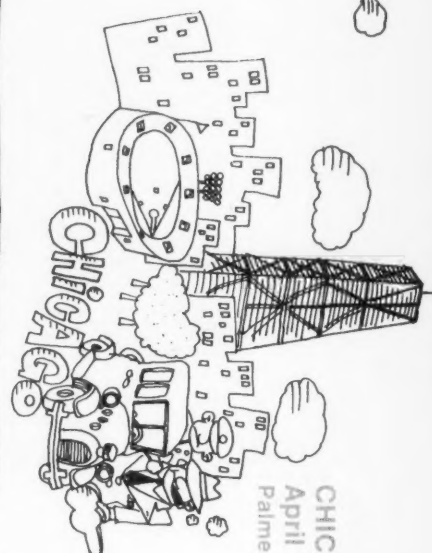


DALLAS
March 21-23
Market Hall

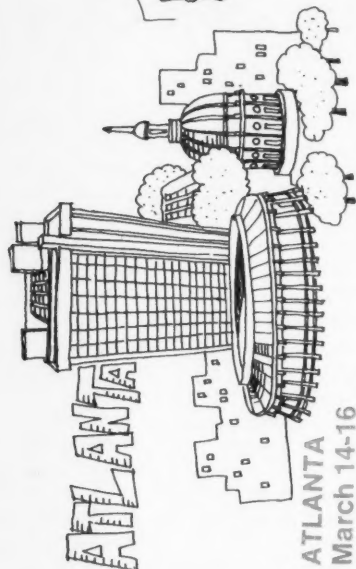
SAN FRANCISCO
April 10-12
Fairmont Hotel



DETROIT
April 25-27
Cobo Hall



CHICAGO
April 18-20
Palmer House



ATLANTA
March 14-16
Regency Hyatt House



NEW YORK
Feb. 29-March 2
Americana Hotel



WASHINGTON
March 7-9
Washington Hilton

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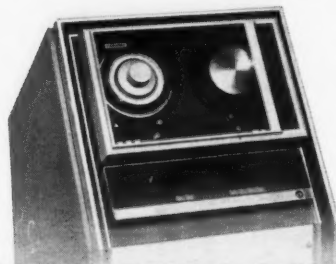
THE COMPUTER CARAVAN

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Inventory Management - Part III

Orders Can Anticipate 'Lumpy' Demand

By Richard T. Lilly

Special to Computerworld

As noted last week, there must be sufficient documentation so that upper management can establish inventory policies, examine the effect of those policies and consider alternatives. But any system will fail when users (on all levels) are unable to comprehend its contents.

To that end, documentation must be good enough to allow operating management to understand the principles and theories involved in the

In prior installments, Lilly showed how inaccurate balance-on-hand amounts can be controlled, and outlined a comprehensive warehouse control report for management's use. Here he cites the hazards of ineffective documentation in general, and details how "lumpy" demand can be anticipated.

system, and operating personnel to understand the reports, exceptions and actions to be taken on a day-to-day basis.

The system's documentors must be careful not to become too technical in system's explanation for the user. Technical explanations where required should be in an appendix.

Other documentation should be:

- Definition of terms used in the documentation.
- Definition of reports, their function and action to be performed.
- Layout of all input.
- System flow.
- Action to be taken based on exception output.
- Data control procedures.

Each person at all levels of control should have sufficient information to enable him to manage his portion of the system, however small. Lack of this information is a system malfunction.

Most sophisticated inventory control systems use some types of averaging techniques to forecast demand for future periods. One of the main benefits to be gained by computerization of inventory is the measurement of the error in the forecast (the Mean Absolute Deviation) and its use in established safety stock to meet a required level of customer service.

Most often overlooked, however, is the fact that a number of items do not have a demand which is predictable, due to their 'lumpy' character. A lumpy item is one which, for example, has a low volume except for two successive periods.

If the Mean Absolute Deviation of the item based on a horizontal (constant) model is greater than 60% of the average, it can be assumed to be lumpy.

When a lumpy item is treated as a constant item, an excessive amount of inventory is often generated since the safety stock is too large. Yet even with this value of inventory, the two large demands may not be satisfied. Therefore, we should establish two reorder policies to be used with lumpy items, based on peaks and valleys of demand.

The user must decide whether he can justify carrying a higher level of inventory to accommodate the high demand (peak) that occurs infrequently. If this is justifiable, the reorder point is based on the large peak demands for an item.

If not justifiable, the reorder point will be based on the low volume demands (valley). Unless an item is specifically designated as a peak reorder point item, a valley reorder point will be computed.

For valleys compute the average of all demands less than the original average, then compute the reorder point equal to the valley average X Lead-time + 2.

For peak reorder point, compute the average of all demands through a lead time for all lead time demands greater than the original average through the lead time. Then compute the reorder point equal to this peak average times a safety factor. This safety factor should be greater than 1, and less than 2.0. An initial value of 1.3 is suggested.

These are the Seven Deadly Sins of Computerized Inventory Control. We have encountered few systems which did not contain a number of these problems. If we list them again . . .

- Lack of adjustment filter.
- Inability to trace rejected transactions.
- Inability to trace updated transactions.
- No control of floating requirements.
- Lack of continuing management control.
- Insufficient user documentation.
- Ignoring the presence of lumpy demand.

. . . we see that all are expressed as: "lack of," "inability to," etc.

Thus, the system designer must ensure that, upon implementation, full audit trail control is available at all levels of management.

One final suggestion must be added to overlay the Seven Deadly Sins. Please, please, please do not ignore the need for initial and continuing participation on the part of operating management, beginning with the system design, through implementation and continuing with constant maintenance and supervision of the inventory management system.

Richard T. Lilly is president of Manufacturing Management Sciences Inc., Burlington, Mass.

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*Bits and Pieces***BTC Allows Mohawk 2400 To Use Complot Plotters**

BELLAIRE, Texas — The BTC-7/2400 Batch Terminal Controller from the Houston Instrument Division of Bausch & Lomb, Inc., enables users of Mohawk 2400 series terminals to attach Complot Incremental Plotters.

The interface can be installed in less than one hour and allows automatic plotting up to speeds of 300 step/sec using the Complot DP-1 or DP-3 plotter. Software to generate plot codes for transmission to MDS 2400 systems is supplied.

The BTC-7/2400, with plotter stand, is priced at \$2,445. Delivery is 30 days from 4950 Terminal Ave., 77401.

Datum Printer Increases Speed Of PDP-8 Output by Factor of 10

ANAHEIM, Calif. — The Datum Inc. 5096 Line Printer System is designed to provide PDP-8 users with a tenfold increase in printer output at a price of under \$3,000.

The printer system operates at 100 char./sec and consists of a serial impact printer, controller, software and cables.

The unit features the production of six copies, and prints the 64-character upper case Ascii subset, with other formats available. The unit is currently available from 170 E. Liberty Ave., 92801.

TST 717 Replaces IBM 2741

ROCKVILLE, Md. — The TST 717, a Selectric-based data communication terminal designed to replace the IBM 2741, is priced 10% to 15% below the IBM unit.

The terminal, from TST Communications, Inc., operates at 15 char./sec and includes as standard equipment several features that are options on the 2741. These include: dial up, interrupt and Typamatic keys. The rental price of the IBM unit so equipped is \$105.50/mo.

The TST 717 is available on a 30-day delivery schedule from 2351 Shady Grove Road, 20850.

Winder Has Automatic Clutch

KANSAS CITY, Mo. — The I-Winder punched paper tape winder from Inland Office Products features an automatic clutch that regulates tension and controls the speed of the winding.

The unit has an aluminum case and operates from 110V. The price is \$85 and shipment is from stock from 1720 Cherry St., 64108.

Low-Cost 32-bit CPU**Systems 85 Real-Time System Bows**

FORT LAUDERDALE, Fla. — The Systems 85 real-time processor from Systems Engineering Laboratories, Inc., a lower powered version of the company's Model 86, is described as the lowest price 32-bit computer system available.

Competitive in performance with such machines as the XDS Sigma 5 and the DEC System Ten, the Systems 85 offers prices that are from 20% to 40% lower, SEL said last week.

Compared to the SEL Model 86 which has a 600 nsec cycle time, the Model 85 has a cycle time of 850 nsec and prices that are 10% to 20% lower.

The Systems 85 is available with core memory expandable from 8K to 128K words, with memory byte parity and page protection standard. The 85 requires one instruction to address any bit, byte, half-word, word or double word in memory.

Total data handling capacity of the Systems 85 is 1.17 million word/sec. Up to 16 simultaneous device controller channels, each of which can handle one or more peripherals, can be attached to the computer's I/O bus.

The Systems 85 is hardware and software compatible with the 86. Software available includes operating systems for real-time multiprogramming and for batch processing. Real-time Monitor (RTM) provides a software priority structure for concurrent execution of up to 255 tasks, and permits job-stack processing in a background mode.

Both the Batch Processing System (BPS) and RTM support a variety of language

processors including extended Fortran IV, macro assembler, media conversion programs, utilities, debug routines and diagnostics.

Prices for the Systems 85 range from \$150,000 for a 32K system with a teletypewriter to more than \$400,000. Lease prices start at \$1,200/mo with one-, three-, and five-year arrangements available. First deliveries will be made in July 1972.

A complete line of peripherals is available for use with the Systems 85. These include ISS and CDC disk drives, both fixed and moving head types and CDC

magnetic tape drives.

A comparison of the Systems 85 against similar configurations of the DEC System Ten and the XDS Sigma 5 reveals the following. The prices of the systems are roughly comparable, with the XDS and DEC systems both somewhat higher, at about \$199,000 and \$213,000, respectively, while the SEL system is priced at \$180,000.

Cycle time of both the SEL and XDS systems is 850 nsec and the DEC is 1.0 μ sec. The number of instructions performed/dollar is 2.5 on the Systems 85, 1.8 on the Sigma 5 and 1.9 on the DEC System Ten.

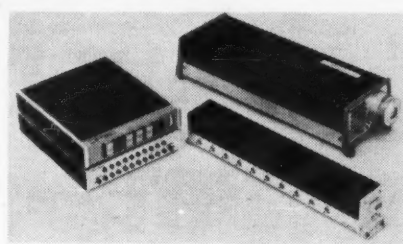
Royco 205A Monitoring System Prevents Damage to Disk Drum

MENLO PARK, Calif. — An automatic maintenance monitoring system for rotating memory devices from Royco Instruments, Inc. is designed to protect the user against head crashes.

The Model 205A is intended to ease maintenance procedures for disk packs and drives by automatically detecting particle build-ups that can cause data errors, failures or head crashes, the company said.

Up to 10 memory units, either disks or drums, can be monitored by a single Royco device.

Unit deterioration caused by dirt, pack



Royco 205A Components

warpage, oil bearing leaks, or other mechanical trouble in the drive can be detected.

Excessive particle counts trigger an alarm lamp, sound an audible signal and, optionally, retract the read/write heads to prevent disk or drum damage.

The Model 205A automatic maintenance monitor system, complete with underfloor mounted valve manifold and sensor plus a maintenance level indicator module and auto-sequencer/alarm panel, sells for \$3,400 and leases for \$105/mo. Delivery is 30 days from 141 Jefferson Drive, 94025.

Tape Cleaned in 5 Minutes

TARZANA, Calif. — The Mark IV magnetic tape cleaner from Data Devices, Inc. uses no consumable supplies.

The device removes oxide clumps, dirt and foreign particles from tape using a cylindrical blade to clean the oxide while a screen cleaner is used for the backing. At the rate of 180 in./sec, a two-pass cleaning takes five minutes.

Priced at \$2,300, the Mark IV is available on two-week delivery from 18360 Topham St., 91356.

Programmed Terminal Uses ROM

CAMBRIDGE, Mass. — The Series 200 line of programmable alphanumeric CRT terminals from Computek, Inc. combine the best features of both programmable and hardwired systems.

The program for the terminal is stored in nondestructible ROM. New programs are easily constructed, according to the company. Replacements are made by exchanging plug-in program boards. The flexibility of programming is retained, without the sacrifice of reliability and convenience, the company said.

The Computek 200 can be programmed to generate locally, verify, edit and manipulate large data files, either as a single unit or as part of a multiple-unit configuration. A wide range of I/O peripherals, including hard copy devices, mag tape cassettes, disks, badge readers and printers can be controlled by the terminals. Local processing, such as subtotaling and tax computation, can be performed.

Serial RS-232C interfaces allow the

handling of 110 to 9,600 bit/sec data rates. Parallel interfaces, allowing data transfer at rates of up to 350,000 bit/sec to most computers, are also available.

As many as 4K 16-bit words of micro-programming can be stored in the MOS ROM. A display refresh buffer, consisting of 2K 10-bit words, is provided.

The display consists of a 14 in. screen displaying 80 char./line and 25 line/page. The 64-character Ascii set includes upper and lower case formed by a 9 by 13 dot matrix. Refresh rate is 60 frame/sec.

The 68-key keyboard includes a set of 10 for numerics or special functions and includes controls for full cursor movement, local editing functions and system operations.

Local editing, logic functions and control can be programmed.

The price of a single stand-alone terminal is \$4,570. Delivery is 90 days from 143 Albany St., 02139.

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Univac Offers DP Disk

BLUE BELL, Pa. — Univac 400 and 1100 users will be able to replace their Fastrand II magnetic drums with a disk system that has been added to the Univac 8400 disk series.

Acquired from Data Products, Inc., which offered the device as the 1108-compatible 7114, the 44 million word unit features a minimum access time of 10 msec, three times faster than the Fastrand II. Average latency time is 17 msec compared to 35 msec for the Univac unit.

In most respects the disk is compatible with the drum. Both have 64 sector/track with 28 36-bit word/sector. The transfer rate of the disk is significantly higher than the drum at 262KC compared to 158KC.

Rotational speed of the disk is 1,800 rpm compared to 880 rpm for the Fastrand II. The number of read/write heads on the former 7114 at 40 is about 2/3 that of the 64 heads on the drum.

Univac has not announced the disk drive prices, but they are expected to differ not too greatly from the price set by Data Products at 35% less than the \$3,750/mo charged by Univac for its Fastrand II.



High Speed Card Terminal

Futuronic Terminal Processes 112 CPM

FREEPORT, N.Y. — The High-Speed Card Terminal from Futuronic, Inc. is the first unit available to punch, interpret and read cards at speeds as high as 112 card/min, according to the company.

Intended for on-line data processing either as a stand-alone unit or as part of a system, the terminal features read-after-punch capability, and can repunch a new card after an error is detected.

The terminal can also be used as a keypunch, with an optional keyboard. The unit is priced at \$18,000. Delivery is 90 days from 178 Hanse Ave., 11520.

Corpak Reduces Cost Of PDP-8 Memory

LOS ANGELES — The Corpak-8 from Information Control Corp. will allow DEC PDP-8 users to save up to 38% on the cost of add-on memory, ICC said.

The user with a PDP-8/I with 8K of memory who wishes to expand it would have to pay \$10,600 for each 8K from the mini manufacturer. The price of the ICC add-on is \$6,400 for the first 8K and \$3,132 for each 4K after that, up to the computer's limit of 28K of add-on.

Corpak-8 memories are available from 9610 Bellanca Ave., 90045.

Software Enhancements Added to Data Editor

MINNEAPOLIS, Minn. — Data Action has added several no-cost software enhancements to its 1500 Data Editor System.

The Data Editor is a mini-based system used to edit and validate data prepared on a key-to-tape system for computer input.

The enhancements include a report writer, enhanced data editing and validating capabilities, generalized tape-to-print and a data file update utility.

A typical 1500 Data Editor System including a magnetic tape drive, 300 line/min printer and CPU, leases for \$2,300/mo. The software enhancements are immediately available from 4445 W. 77th St., 55435.

Potter VIP Plan Encourages User Diversification

MELVILLE, N.Y. — The Potter Instrument Co. announced a multi-product/prompt payment incentive plan designed to encourage users to use more than one Potter product line and to pay monthly rentals promptly.

Called the Volume Incentive Plan (VIP), it provides a sliding scale of discounts based on the number of different products leased and the promptness of payment. The plan includes tape drives, disk drives, printers, controllers, memories and data communications equipment.

Potter Instrument Co. is at 532 Broad Hollow Road, 11746.

Correction

In CW, Dec. 29-Jan. 5, the monthly rental of the Nanodata QM-1 should have been \$7,000/mo.

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MIT Gets Grant For DP Library

CAMBRIDGE, Mass. — The Council on Library Resources has granted \$400,000 to MIT to support for one year an experimental, computer-operated technical library that could be a prototype for information retrieval systems in libraries.

The heart of Project Intrex (Information Transfer Experiments) is an IBM 7094 programmed in accordance with MIT's time-sharing system which allows it to be used simultaneously by many persons from remote access terminals.

The Intrex data base, stored in the computer on magnetic disk, contains a growing technical library of detailed catalog information and microfilm texts of more than 15,000 recent articles in the field of materials science and engineering.

The Intrex user conducts literature searches by typing out questions and commands on the keyboard of a remote access terminal. The computer instructs the novice how to use the system as he proceeds, and anyone who can type the word "begin" (the code word for the instruction program) can start work almost at once.

'Runt' Is Small-Core 'Run'

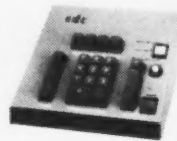
SEATTLE — The University of Washington has developed a small-core version of RUN, the Fortran compiler for the Control Data 6000 series computers. The miniaturized processor, which has been distributed to 15 other installations, is named, appropriately enough, Runt.

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computer industry

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January 19, 1972

Page 25

CI Notes

IBM Realigns DP Operations

ARMONK, N.Y. — IBM has realigned its Data Processing Group into two operating groups — one for marketing and services, the other for development and manufacturing.

The group responsible for the company's data processing marketing and services will include the data processing, field engineering and advanced systems development divisions. It will be headed by Dean R. McKay, senior vice-president and group executive. McKay was a member of the company's management committee.

The development and manufacturing group, with responsibilities for the company's worldwide computer products line, will include the components, general systems, systems development and systems manufacturing divisions. It will be headed by John R. Opel, senior vice-president and group executive, who was a member of the management committee.

3330 for 360 Expected Soon

NEW YORK — A 3330-like disk system that can be used with the larger models of the IBM 360 line will be announced within a month, sources said here last week.

While almost all of the independent peripheral manufacturers are said to be working on such devices, at least one has a prototype up and working, the sources said, and will announce it soon.

The sources also said that there should be a fallout in the independent disk market, winnowing the number of firms in the business to as low as three when deliveries of the 3330-compatible drives begin by the independents.

Controls May Aid Simulation

NEW YORK — Wage/price controls will be beneficial to computer simulation during 1972, as firms will increasingly use corporate modeling "to prove their case" to wage/price boards, according to Jackson S. Gouraud, president of On-Line Decisions, Inc.

In proving its cases for price increases, management must not only prove the increases are "justified" but demonstrate they will not result in an increase in pretax profit margins. To do this, firms will have to project productivity changes, he said.

"The increasing use of computer modeling will result in programming efficiencies during the year ahead. Moreover, the increased use of interactive models will result in lower time-sharing costs," he said.

Supershorts

Singer's Friden Division has changed its name to Business Machines Division of The Singer Co.

Orders totalling approximately \$1 million for computer output microfilm (COM) systems received by California Computer Products, Inc. in December indicate that this previously dormant segment of the computer graphics business may achieve a 12% per year growth rate through 1975, according to Lester L. Kilpatrick, Calcomp president.

Second Industry Forecast

Communications to Pace DP Growth

PHILADELPHIA — Paced by increases in data communications, the computer industry will resume its formerly high levels of growth, according to Auerbach Corp. here.

Auerbach is the second major research firm to report on future directions of the computer industry, and its conclusions pretty well match those reported by International Data Corp. [CW, Jan. 12], in that both firms see the computer industry resuming a high level of growth.

The U.S. computer industry will enjoy sustained growth throughout the remainder of this decade, Isaac L. Auerbach, president said, but an increasing dependence on foreign markets, and a general reorientation to the market will be required to realize this success.

'Slightly Lower'

"Despite unfavorable economic conditions, a diminishing of the domestic customer base, and a general maturing of the industry, future growth rates of the computer industry will be only slightly lower than those of recent years," Auerbach said.

"There will be a shift in emphasis from

technological changes to the development of integrated systems in which hardware and software are accorded equal status in the solution of a user's specific problems.

"In addition, users of computers have become more conscious of costs and more aware of the critical impact of their computer operations on the successful functioning of their daily business operations. As a result the user is no longer content to take whatever the computer manufacturers offer. They are beginning to know how computers can best be applied to their needs and are demanding a new responsiveness from suppliers," he said.

Advances in data communication technology will be a major stimulus to the expansion of the computer industry in the U.S., virtually setting the pace for the development of the industry during the 1970s, he added.

Small computer systems will emerge with the highest growth rate during the next five years, an average rate of 22% per year in gross shipments and 21% per year in installed base, the firm said.

Medium computer systems will have the second highest growth rate, mainly be-

cause of growth in the foreign market. The installed base of these computer systems is expected to grow at the rate of 17% per year. By contrast, medium computer systems in the U.S. will grow at a rate of only 12%, indicating that a modest level of market saturation now exists.

Large computer systems will enjoy the second highest growth in the U.S., about 15%, due mainly to the trend toward on-line data communications systems. In terms of dollars, the installed base of large computer systems worldwide is expected to increase from \$7.3 billion in 1970 to \$17.7 billion in 1976.

Extra-large computer systems will experience the lowest growth rate in the worldwide installed base, averaging 13% yearly. Demand for extra-large computer systems will be stimulated mainly by large sophisticated data base management systems which will begin to attain operational status and wider acceptance during the 1970s.

Data communications growth is best characterized by Auerbach by the fact that the installed computer base possessing data communications capability will increase from 20% in 1970 to 50% in 1976.

While the computer industry generally is maturing, Auerbach points to the theoretical side of computer science as an area of the industry still in infancy.

"The computer field still lacks a scientific base," Auerbach said, "and without such a base the development of a comprehensive theory of data processing is impossible. And such a theory is the only sure means of measuring the efficiency of an EDP system and of knowing how close to the mark a given computer system has come. To do this the EDP equivalents of physical quantities and properties must be identified.

"Now that the industry is approaching maturity and users are demanding more ambitious and complex application packages, the long-deferred task of coming to grips with the properties of information systems has become acute. We may not see the full development of the required theoretical structures during the 1970s," Auerbach said, "but I believe we will at least see a strong beginning."

Caravan Highlights Terminals

NEWTON, Mass. — Terminals and data entry equipment will be the major features at the upcoming Computer Caravan, which will travel to nine cities in 10 weeks under the sponsorship of Computerworld.

At the same time, almost every other segment of the computer industry will be represented on the exhibit floor of the Computer Users Forum and Exposition which will begin its cross-country trip with a meeting in Boston Feb. 22-24.

"Almost all of the major data entry manufacturers" have already signed up for the show, which is still taking booth reservations, according to Charles Asmus, general manager for the show.

In addition, he said that firms representing the minicomputer area will also be prominent on the exhibit floor, with such companies as Lockheed Electronics, Hewlett-Packard, Varian Data Machines,

Interdata and Texas Instruments planning to show their wares to the more than 25,000 expected visitors.

Several firms are also taking advantage of a new innovation to be offered in conjunction with the Caravan, Asmus said. Firms will be allowed, he said, to rent meeting rooms to put on presentations to interested users, away from the convention floor.

Under this arrangement, for example, a firm could give a short tutorial on how to purchase packaged software or how to best select a data entry system or minicomputer, he said.

Besides Boston, the Caravan will travel to New York City, Washington, D.C., Atlanta, Dallas, Los Angeles, San Francisco, Chicago and Detroit. More than 85% of the computer users in the U.S. are within two hours of one of the sites, Asmus said.

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New Marketing, Minis Mark GA's Entry Into OEM

NEW YORK — General Automation (GA) has launched a major drive into the OEM mini market with the introduction of nine machines and a new sales policy designed to provide OEM purchasers with "greater freedom in the development, test and shipment of their own products," according to the com-

pany.

Six machines are evolved from the firm's SPC-16 family, and three from the SPC-12. Quantity prices start under \$2,000.

The new marketing policies "represent an initial step towards providing more latitude to OEM buyers while encouraging them to experiment with new

applications," stated Jay L. Kear, director of sales.

The sliding commitment delivery schedule provides up to 12-month delivery leeway for OEM customers, and is designed to eliminate "chargebacks" by the firm for buyers' failures to accept products at the first year's contracted order level.

Under the GA plan, a buyer must take delivery of the first systems on schedule at the start-up phase. But he can then delay the beginning of his contract for production unit shipments for up to 12 months beyond the dates of the first unit shipment without any chargebacks.

Under its selective rental plan, GA offers a number of computers, including all necessary peripherals, controllers and software, on a 30-day cancellation

basis. The policy is designed to encourage development of new OEM applications, by eliminating capital outlays during the project prove-out stage.

The double warranty policy provides a 90-day warranty on all products which the OEMer can pass along to the end user.

Under its new discount schedule, GA will allow up to 40% of its new product lines.

Two Configurations

The SPC-16 minis are available in two configurations. Models 16/40, 60 and 80, designed for the middle range, have a main memory of 4K expandable to 16K, a Teletype control unit, and an "integral I/O package." Single unit prices are \$5,550, \$6,550 and \$8,550 respectively.

Models 16/45, 65 and 85 can be purchased in small modules on a "bare bones" basis, offering a minimum 4K processor with all other features optional. Alternatively, the units can be expanded to 65K, handling more than 64 peripherals. Unit prices for the 16/45, 65 and 85 start at \$3,950, \$4,950 and \$6,950 respectively.

Models 12/10, 20 and 30 are self-contained control systems with up to 16K memory and software, interfacing and mini-controllers integrated into their modular design. Unit prices are \$2,980 for the 12/10, \$3,480 for the 12/20 and \$3,980 for the 12/30.

Deliveries are slated to begin in March, with 60-day delivery initially. The firm is at 1055 S. East St., Anaheim, Calif., 92805.

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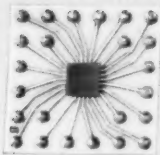


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POTTER Solid State Memories for your 360 give you

- up to double the storage capacity
- higher reliability
- low rental costs
- less Maintenance and downtime
- lower Power requirements
- lower space requirements



The Potter n-channel MOS units utilize 370 technology to give you up to double the storage capacity in less space and for less money than comparable IBM units.

The advanced solid state design lets us package 1024 bits of memory on a single .125 x .125 chip (see cutaway). This results in substantially smaller overall size, lower power requirements and consequent lower power bills and air conditioning load. Another advantage is the elimination of literally tens of thousands of solder connections which are a source of failure in core type memories.

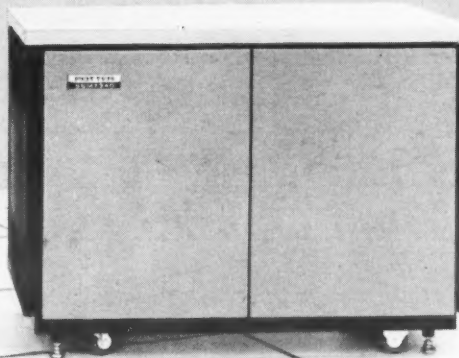
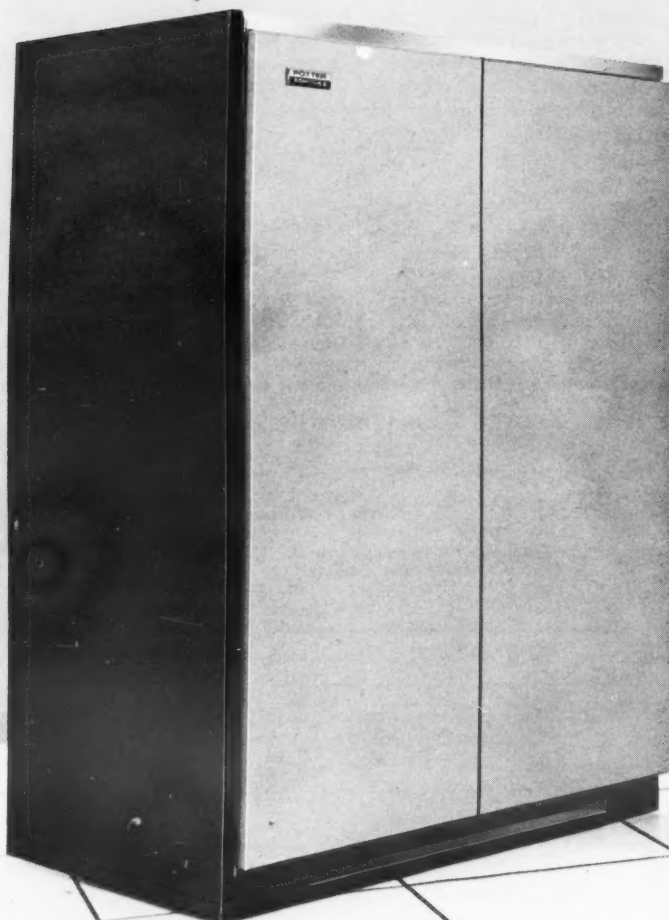
Potter Solid State memories are available for use on 360 models 30, 40, 50 and 65/67... and they are ready for delivery now! In addition to their low cost and many other advantages, Potter Solid State Memories are backed up by a nationwide organization of field service engineers.

For more information on these memories or on Potter's Magnetic Tape Units, Tape Controllers, Disk Drives, Disk Controllers and Line Printers, call your local Potter Sales Representative today. Or, contact Potter Instrument Company, Inc., 532 Broad Hollow Road, Melville, N.Y. 11746 (Phone 516-694-9000).



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Cogar Sets Financing With Bank, Singer

WAPPINGERS FALLS, N.Y. — Cogar Corp. has announced a financing plan that could bring the financially troubled firm up to \$3.5 million through the sale of stock and bank loans.

Last year the firm lost \$8.3 million on sales of \$1.2 million, up from a loss of \$3.5 million on sales of \$152,161 a year earlier. The firm also has suspended marketing of its System 4 system due to financial problems.

Under the new plan, Cogar will sell 250,000 shares of common at \$5 per share, and if that offering is successful it could obtain loans of up to \$2.3 million.

Potential buyers of the stock will have to make a minimum investment of \$10,000 and will have to agree to hold the stock for at least one year.

If the sale is successful, Chemical Bank will lend Cogar up to \$1.8 million. The bank has the option to let Singer Co. purchase up to \$500,000 of the loan, and if it does, the bank would then lend Cogar an additional \$500,000.

In addition, Cogar would be prohibited from taking any new, special business without the consent of either Singer, Chemical Bank or the Oneida National Bank and Trust Co., which has also invested heavily in the firm.

Honeywell Predicts Rise In '72 Keyplex Shipments

WALTHAM, Mass. — Honeywell Inc. reported that at year-end installations of its Keyplex systems number over 100 worldwide with "very high" backlog levels going into 1972.

Edward C. Lund, vice-president and general manager of the firm's North American Operations, projected "significant" increases in both net bookings and shipments for 1972.

The increased shipments will result, in part, from efficiencies realized by the transfer of production work from San Diego to Massachusetts slated for completion this spring, he said. An estimated 60 key personnel are transferring to the Boston area beginning this month.

Lund said bookings for the key-to-disk Keyplex systems "will continue to increase in North America and particularly in European markets such as the United Kingdom, France, Germany, Italy and Spain where Keyplex has been successful."

Keyplex deliveries began in February last year from San Diego. Shipments will begin from Massachusetts plants sometime during the second quarter, he said. No interruption in delivery schedule will result from the production shift, he added.



Computerworld Stock Trading Summary

All statistics
compiled, computed
and formatted by
TRADE*QUOTES, INC.
Cambridge, Mass. 02139

CLOSING PRICES THURSDAY, JANUARY 13, 1971

E X C H	PRICE			
	1971 RANGE (1)	CLOSE JAN 13 1971	WEEK NET CHNGE	WEEK PCT CHNGE

SOFTWARE & EDP SERVICES

O	ADVANCED COMP TECH	1- 4	1 1/8	0	0.0
A	APPLIED DATA RES.	5- 13	6 1/4	+ 1/2	+8.6
O	APPLIED LOGIC	1- 3	3	0	0.0
N	AUTOMATIC DATA PROC	44- 78	78 1/4	+5	+6.8
O	AUTO SCIENCES	1- 8	1/2	+ 1/8	+33.3
O	COMPUTER NETWORK	2- 11	6 1/2	- 1/4	-3.7

O	COMPUTER PROPERTY	5- 11	5	0	0.0
N	COMPUTER SCIENCES	6- 17	7 7/8	- 1/2	-5.9
O	COMPUTER TECHNOLOGY	4- 11	6	- 5/8	-9.4
O	COMPUTER USAGE	5- 16	10 1/8	+1 1/8	+12.5
O	COMP AUTOMOT REPORTS	6- 13	7 1/4	0	0.0
N	COMPUTING & SOFTWARE	17- 45	22 1/4	- 1/2	-2.1

O	COMRESS	1- 4	1 3/4	+ 3/8	+27.2
O	CONSHARE	4- 8	5 1/2	- 1/4	-4.3
O	DATA AUTOMATION	1- 4	1/2	0	0.0
O	DATA PACKAGING	6- 10	6 1/4	+ 1/8	+2.0
O	DATAMATION SERVICE	1- 3	3/4	+ 1/4	+50.0
L	DATATAB	4- 10	6 7/8	-1 5/8	-19.1

O	EDP RESOURCES	5- 10	7 3/8	- 1/4	-3.2
A	ELECT COMP PROG	2- 7	3	- 3/8	-11.1
N	ELECTRONIC DATA SYS.	34- 85	56 1/4	+4 1/4	+8.1
O	INFORMATICS	6- 15	9 7/8	+ 3/4	+8.2
O	I.O.A. DATA CORP	1- 3	1 1/2	+ 1/4	+20.0
A	ITEL	7- 23	9 5/8	- 1/4	-2.5

O	KEANE ASSOCIATES	4- 14	6 1/2	+1	+18.1
O	KEYDATA CORP	5- 14	7 1/8	+ 3/8	+5.5
A	MANAGEMENT DATA	5- 11	6 3/8	- 1/4	-3.7
O	NATIONAL CSS INC	7- 14	10 1/4	+1 1/2	+17.1
O	NAT COMP ANALYSTS	1- 4	3/4	+ 1/8	+20.0
P	ON LINE SYSTEMS INC	7- 18	9 1/8	-1 1/8	-10.9

N	PLANNING RESEARCH	10- 26	14 1/2	+ 1/8	+0.8
O	PROGRAMMING METHODS	16- 29	23 3/4	+ 1/2	+2.1
O	PROGRAMMING & SYS	1- 4	1 3/4	- 1/8	-6.6
O	SCIENTIFIC COMPUTERS	2- 4	4 1/8	+ 1/2	+13.7
O	SIMPLICITY COMPUTER	1- 4	3 1/8	0	0.0
O	SOFTWARE SYSTEMS	1- 3	1 1/8	+ 1/4	+28.5

O	TBS COMPUTER CENTERS	4- 9	3 3/4	- 1/8	-3.2
O	TOLLEY INTL CORP	3- 8	7 1/8	- 1/8	-1.7
O	TRACOR COMPUTING	2- 5	2 1/2	0	0.0
O	TYMSHARE INC	4- 15	8	- 1/4	-3.0
O	UNITED DATA CENTER	2- 7	5 1/4	+ 1/2	+10.5
N	UNIVERSITY COMPUTING	14- 33	18 7/8	-2 1/2	-11.6

A	URS SYSTEMS	5- 11	6 7/8	- 1/4	-3.5
O	VORTEX CORP	2- 6	4 3/4	0	0.0

PERIPHERALS & SUBSYSTEMS

N	ADDRESSOGRAPH-MULT.	24- 48	33 3/4	-1 7/8	-5.2
O	ALPHANUMERIC	1- 6	1 1/4	+ 3/8	+42.8
N	AMPEX CORP	11- 25	11	-3 3/4	-25.4
O	ANDERSON JACOBSON	5- 10	5 3/8	- 1/8	-2.2
O	ATLANTIC TECHNOLOGY	3- 8	3 3/8	+ 1/4	+8.0
A	BOLT, BERANEK & NEV	4- 8	6 3/4	- 1/8	-1.8

N	BUNKER-RADIO	6- 17	8 7/8	- 3/8	-4.0
A	CALCOMP	14- 33	19 1/8	- 3/8	-1.9
O	COGNITRONICS	2- 9	2 3/4	- 1/2	-15.3
O	COLORADO INSTRUMENTS	2- 8	2	0	0.0
O	COMPUTER COMMUN.	5- 19	6	- 1/4	-4.0
A	COMPUTER EQUIPMENT	3- 7	3 3/4	+ 1/4	+7.1

A	COMPUSET	4- 20	6 1/2	+ 1/2	+8.3
O	CONSOL COMPUTER LTD.	1- 12	1/2	0	0.0
A	DATA PRODUCTS CORP	3- 10	5 1/8	- 5/8	-10.8
O	DATA RECOGNITION	3- 3	4 1/4	0	0.0
O	DATA TECHNOLOGY	3- 9	3 5/8	- 1/4	-6.4
O	DIGITRONICS	2- 8	3 3/8	+ 1/8	+3.8

N	ELECTRONIC M & M	5- 16	5 7/8	-1	-14.5
O	FABRI-TEK	2- 4	2 5/8	+ 3/8	+16.6
O	GENERAL COMPUTER SYS	6- 10	10	+2 1/4	+29.0
N	GENERAL ELECTRIC	53-124	63 1/8	- 5/8	-0.3
O	INFOMEX INC	17- 49	33 1/2	+3	+9.8
O	INFORMATION DISPLAYS	3- 8	4 5/8	- 3/8	-7.5

O	MANAGEMENT ASSIST	1- 2	7/8	0	0.0
A	MARSHALL INDUSTRIES	7- 27	11 5/8	+2	+20.7
N	MEMOREX	20- 78	29 1/4	-2 1/4	-7.1
A	MILGO ELECTRONICS	12- 26	20 1/8	+3 3/8	+20.1
N	MOHAWK DATA SCI	15- 47	20 3/4	-1 1/2	-6.7
O	OPTICAL SCANNING	6- 18	8 1/4	- 7/8	-9.5

O	PHOTON	6- 12	10 5/8	+2 1/8	+25.0
A	POTTER INSTRUMENT	11- 25	16 5/8	+1 1/4	+8.1
O	PRECISION INST.	7- 16	10 3/4	+1 1/8	+11.6
O	RECOGNITION EQUIP	9- 26	12 3/4	+ 3/8	+3.0
O	REDCOR CORP.	1- 9	2	0	0.0
N	SANDERS ASSOCIATES	9- 22	16 1/8	+ 3/8	+2.3

O	SCAN DATA	6- 15	10 7/8	- 5/8	-5.4
O	TALLY CORP.	6- 16	9	+ 1/2	+5.8
N	TELEX	3- 22	11 3/4	- 1/4	-2.0

SUPPLIES & ACCESSORIES

N	ADAMS-MILLIS CORP	9- 19	12 1/4	0	0.0
O	BALTIMORE BUS FORMS	6- 10	7 1/4	+ 1/2	+7.4
A	BARRY WRIGHT	7- 13	8 5/8	- 3/4	-8.0
A	DATA DOCUMENTS	14- 29	20 1/2	+1 1/2	+7.8
O	DUPLEX PRODUCTS INC	3- 13	12 1/2	+ 1/4	+2.0
N	ENNIS BUS. FORMS	5- 13	8 1/2	+1	+13.3

O	GRAHAM MAGNETICS	9- 35	18 1/4	+2 1/4	+14.0
O	GRAPHIC CONTROLS	6- 15	12 1/2	-1 1/4	-9.0
N	3M COMPANY	96-135	130 1/2	-3	-2.2
O	MOORE BUS. FORMS	36- 44	43 7/8	+ 7/8	+2.0

E X C H	PRICE			
	1971 RANGE (1)	CLOSE JAN 13 1971	WEEK NET CHNGE	WEEK PCT CHNGE

N	NASHUA CORP	29- 50	48 7/8	+ 1/4	+0.5
O	REYNOLDS & REYNOL	37- 63	62 1/2	+3	+5.0
O	STANDARD REGISTER	14- 23	18 1/4	+ 1/2	+2.8
O	TAB PRODUCTS CO	8- 17	14 1/4	0	0.0
N	UARC	23- 34	26 1/2	+3 1/2	+15.2
A	WABASH MAGNETICS	5- 10	8 1/8	+ 1/8	+1.5
N	WALLACE BUS FORMS	13- 26	23 1/8	- 1/4	-1.0

COMPUTER SYSTEMS

N	BURROUGHS CORP	105-160	148 3/8	-6 1/8	-3.9
N	COLLINS RADIO	10- 20	15 1/8	- 1/4	-1.6
N	CONTROL DATA CORP	34- 83	43 3/8	-3 5/8	-7.7
O	DATA GENERAL CORP	19- 65	57 1/4	-1 3/4	-2.9
O	DIGITAL COMP CONTROL	4- 24	17 3/4	+2 1/2	+16.3
N	DIGITAL EQUIPMENT	53- 85	72 1/4	-4	-5.2

N	ELECTRONIC ASSOC.	5- 9	6 1/8	0	0.0
A	ELECTRONIC ENGINEER.	5- 10	8 5/8	- 3/8	-4.1
N	FOXBORO	25- 46	34 1/4	-1 7/8	-5.1
O	GENERAL AUTOMATION	9- 26	17	+3 1/2	+25.9
N	HEWLETT-PACKARD CO	30- 50	46 3/4	- 1/8	-0.2
N	HONEYWELL INC	83-137	134	+2 1/2	+1.3

N	IBM	284-364	341	0	0.0
O	INTERDATA INC	6- 11	7 3/4	- 3/8	-4.6
N	NCR	25- 49	28 7/8	- 7/8	-2.9
N	RCA	26- 41	38 1/8	- 5/8	-1.6
N	RAYTHEON CO	27- 46	42 1/8	+2	+4.9
N	SPERRY RAND	23- 33	31 7/8	- 1/8	-0.3

A	SYSTEMS ENG. LABS	7- 18	10 7/8	- 1/4	-2.2
N	VARIAN ASSOCIATES	11- 18	14	- 3/4	-5.0
N	VICTOR COMPTOMETER	12- 27	16 7/8	+ 1/4	+1.5
N	WANG LABS.	29- 50	36 7/8	-3 1/4	-8.0
N	XEROX CORP	85-127	121 1/2	-4 1/4	-3.3

LEASING COMPANIES

A	BOOTHE COMPUTER	11- 27	13 1/8	-1	-7.0
O	BRESNAHAN COMP.	2- 4	2 1/2	+ 1/8	+5.2
O	COMPUTER EXCHANGE	1- 9	2 1/4	+ 1/4	+12.5
A	COMPUTER INVSTRS GRP	7- 14	9 3/8	+1	+11.9
N	DPF INC	3- 19	9 1/8	- 5/8	-6.4
O	DATRONIC RENTAL	2- 4	2 3/8	0	0.0

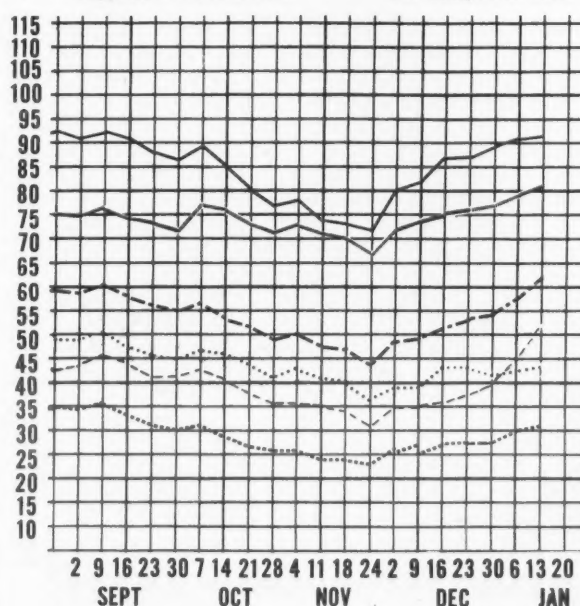
A	DCL INC	5- 13	8 1/4	+ 1/4	+3.1
A	DEARBORN-STORM	12- 23	19	-1	-5.0
A	DPA, INC.	4- 9	4 7/8	- 3/8	-7.1
A	GRANITE MGT	7- 13	8 7/8	+ 3/8	+4.4
A	GREYHOUND COMPUTER	7- 11	8 5/8	+ 3/3	+4.5
N	LEASCO CORP	16- 26	19 7/8	-1 5/8	-7.5

O	LECTRO MGT INC	2- 5	2 7/8	+ 3/8	+15.0
O	NCC INDUSTRIES	3- 9	8 1/4	-1	-10.8
A	ROCKWOOD COMPUTER	3- 9	4 1/4	+ 1/8	+3.0
O	SYSTEMS CAPITAL	3- 7	3 5/8	+ 1/4	+7.4
N	U.S. LEASING	16- 39	36 1/4	- 1/2	-1.3

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER
P=PHIL-BALT-WASH
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Computer Stocks Trading Index

— Computer Systems — Software & EDP Services
..... Peripherals & Subsystems Leasing Companies
— Supplies & Accessories — CW Composite Index



Earnings Reports

NATIONAL INFORMATION SYSTEMS

Nine Months Ended Oct. 31

	1971	1970
Shr Ernd	\$0.4	\$0.4
Revenue	3,564,000	2,936,000
Earnings	120,000	121,000

NATIONAL COMPUTER SYSTEMS

Three Months Ended Oct. 31

	1971	a1970
Shr Ernd	\$0.20	\$0.05
Revenue	1,401,750	1,188,876
bEarnings	102,524	24,273
9 Mo Shr	.33
Revenue	3,345,469	2,904,374
bEarnings	175,069	(122,540)

a-1970 figures weren't restated to reflect proportionate year-end adjustments which increased loss for the year by \$503,696. b-Income taxes were eliminated by the loss carryforward.

COMPUTER TERMINAL

Three Months Ended Oct. 17

	1971	1970
Revenue	\$680,000	\$331,000
Loss	634,000	638,000

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